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UNIVERSITY OF ALBERTA

# SUCCESS PREDICTORS FOR DIPLOMA NURSING STUDENTS

BY

ELEANOR J. HALLMAN ©

A THESIS
SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND
RESEARCH IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR
THE DEGREE OF MASTER OF EDUCATION
IN COUNSELLING PSYCHOLOGY

DEPARTMENT OF EDUCATIONAL PSYCHOLOGY

EDMONTON, ALBERTA
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E J Hallman

Eleanor J. Hallman
9711 - 84 Avenue
Edmonton, Alberta
T6E 2E8

DATE: Oct. 9/92

UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled "Success Predictors for Diploma Nursing Students" submitted by Eleanor J. Hallman in partial fulfilment of the requirements for the degree of Master of Education in Counselling Psychology.

George W. Fitzsimmons

S. Hunka

Stephen M. Hunka

I D Forrest

I. Darle Forrest

Date: Sept. 30/92

# ABSTRACT

The purpose of this study was to identify predictors of success for students in a 24 month nursing diploma program. Data were recorded retrospectively for 351 students who entered the program in 1985, 1986 and 1987. In the study, these groups are referred to by their graduation years of 1988, 1989 and 1990. Descriptive analysis provided information about 48 predictor variables including demographic factors, pre-admission academic criteria and related variables, assessment test results, selection interview rating and program courses. Stepwise multiple regression equations defined predictors of success for six semester 1 courses and semester 2, 3, 4 and 5 averages. The best pre-admission academic predictors for semester 1 courses were high school average, less recent completion of high school, not upgrading previously achieved high school marks, mature student status (defined as 21 years of age or older by registration day) and grade achieved in Biology 30. Scores on the memory and verbal reasoning sections of the Test of Cognitive Skills and those on total reading and reference skills of the Canadian Achievement Tests were also significant predictors. For subsequent semesters 2, 3, 4 and 5, the best predictors were courses taken earlier in the program, in particular, Biological Science and Pharmacology 1.

As the curriculum changed in 1991 with the implementation of the collaborative nursing program, further investigation is warranted.

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# CHAPTER 1

## Introduction

Two critical factors make it important that candidates most likely to succeed are chosen for admission to post-secondary education. Increasing numbers of people are seeking such education and the cost of that education is rising. These are concerns for institutions as well as for individual students. Who to choose and on what basis presents a special challenge to those involved in the selection of students; this challenge is not limited by geography or by program.

The focus of this study is the screening and selecting process of applicants to a hospital-based nursing diploma program. Nurses, like educators in other health care programs, have a dual accountability: to provide quality education for students and to provide society with professional nurses capable of delivering quality health care (Brown, Carpio & Roberts, 1991).

The literature of the past three decades describes a variety of ways to predict students' successful completion of nursing programs begun and success on certification examinations at the completion of those programs. Although, "correct choice of applicants to nursing education programs

. . . can save time, effort, frustration and money" (Dyer, 1987, p. 655), unfortunately, there is still no perfect formula for selecting students.

## Student Selection

The focus of this study is the student selection process at a hospital-based nursing diploma program in Edmonton, Alberta. In recent years, the program's selection committee has annually processed up to 650 applications for 120 student positions. Not all of these applicants are ideal candidates. As they are encouraged to make application to more than one institution to enhance their chances of being selected, programs end up vying for the best applicants. Screening applicants, as a result, can be an awesome task with enormous human resource implications for the selection committee.

As institutional and clinical practicum space is limited, a selective versus an open-door admission policy is necessary. The former shifts the " 'weeding out' process that occurs with rigorous programs from actual course work back to the admissions process" (Petty & Todd, 1985, p.2). It has been shown that fewer dropouts occur when an institution uses a selective admissions process (Petty & Todd). Although an applicant's actual or latent academic ability is an important consideration for any post-secondary program, "people-oriented" professions also require applicants to have interpersonal skills. Nursing requires psychomotor skills as well.

### Attrition

In a program like nursing where clinical, laboratory and some class work requires a high ratio of faculty to students (approximately one-to-eight in the program being studied), a major institutional investment is made in each student. Attrition therefore is costly. Attrition rates in American nursing programs range between 12 and 25% depending on the type of program (Rosenfeld, 1988). During the period of this study, combined attrition rates in Alberta's four hospital and seven college diploma programs as well as the two baccalaureate degree programs ranged between 20 and 29% (Alberta Advanced Education, 1991). This cost affects both the institution and the individual. For each unsuccessful student accepted, another is denied the opportunity of admission. Students may be asked to withdraw from programs for academic and/or clinical reasons. Others may choose to withdraw for financial, health or personal reasons or to pursue another career. Some withdrawals cannot be anticipated or avoided; others might be prevented by improving the methods used to screen and select students from the pool of applicants.

## Backgrounds of Nursing Applicants

In the past, nursing education was pursued traditionally by young women upon completion of high school. However, in the last 10 years, the program in this study has increasingly received applications from candidates of varied backgrounds. These include women who meet the entrance requirements as adults after beginning or raising their families; individuals pursuing a career change by choice and interest or as a result of the economy and job loss; students who have begun other post-secondary educational programs and been unsuccessful or become dissatisfied; individuals from other countries who do not meet Canadian standards in their field and must upgrade their qualifications or begin a new career; men who, like women, are pursuing non-traditional careers; and people in Canada on student visas. Thus, the applicant pool is much more diverse than in the past, which adds to the challenge of selecting those most likely to succeed.

## Departmental Examinations

A special issue that has implications for this study is that in the province of Alberta between 1972 and 1983 there was no standardized grade twelve grading system. As older students pursue post-secondary education in larger numbers than previously, questions are raised about the comparative validity of applicants' transcripts from this time period. These individuals may also lack recent educational experience, adding to the challenge of assessing their potential to succeed in a nursing program. On the other hand, their life and work experiences may well contribute to their success, but nonetheless the departmental examination issue complicates the committee's selection decisions. To address this concern, in 1985 the selection committee initiated the administration of assessment tests to pre-screened applicants to evaluate their academic abilities more completely and more accurately. The administration of these tests generally occurs after the applicant has participated in a group-style selection interview and this testing has continued to the present.

## Purpose of the Study

The objective of this study is to identify what factors will predict the success of students in a 24 month hospital-based nursing diploma program. Specifically, which predictor variables of demographic data, pre-admission academic criteria and related variables, assessment test scores, interview rating and grades achieved in program courses, alone or in combination with others, will predict students' success? For the purpose of this study, success will be defined as achieving a passing grade in academic courses and satisfactory standing in clinical practice as well as passing the annual drug calculations examination. Success will be defined for six semester 1 courses and semester 2, 3, 4 and 5 averages.

What makes this study unique is that the research data includes the results students achieved on the assessment tests used in the selection process, namely the Canadian Achievement Tests (C.A.T.) (level 19) and the Test of Cognitive Skills (T.C.S.) (level 5), as predictor variables. No published literature on their use for this purpose has been found.

## Ethical Considerations

To ensure the protection of the individuals included in this study, a research proposal was submitted for approval to the Ethics Committee, Department of Educational Psychology, Faculty of Education, University of Alberta. In the study, data was collected retrospectively by the researcher from students' confidential nursing school records so an institutional ethical review was deemed unnecessary. In addition, the Director of Nursing Education approved of the research and provided permission for the researcher to gather the data. To protect students' identities and provide confidentiality, the researcher assigned three-digit random numbers to students' raw data as it was recorded on data sheets prior to data entry. The data was kept in a secure area throughout the study to further ensure confidentiality.

## Limitations of the Study

Several variables were not included in the study for a variety of reasons. Had they been included, however, they might have had some bearing on the outcome. Firstly, information regarding ethnic origin was not available. Secondly, only four students' first language was not English and all of them successfully completed the program.

Thirdly, since 1987, marks achieved by students on their licensure examinations written at the completion of their nursing programs have not been reported by student name to schools of nursing. Schools now receive a report anonymously listing students' individual marks. In order to use students' marks as an additional criterion variable, a release of information would have been required from each graduating student. As this was a retrospective study and students often move away after graduation, this data was omitted. Besides, as this examination is norm-referenced, designed to test basic knowledge, and more in depth testing is usually done throughout a student's program, graduates from accredited schools of nursing are expected to pass the examination (McFayden, 1989).

Fourthly, limited information was available about the reasons behind students' withdrawals. It is certainly possible that both academic and clinical difficulties experienced by students could, in fact, be a result of personal problems known or unknown to faculty members, the student counsellor or the school's administrators.

Fifthly, the predictors of student success identified in this study are based on data only from those students who were accepted into the program. Although unfeasible and expensive, better predictions would be possible if all applicants had been accepted into the program and all of their data used to predict success. Finally, the constraints of time and other resources dictated some limits on the data analysis.

In addition, one student's data was not included as she completed the first year of the program in two years as a part-time student. Also, although some students who were asked to withdraw for academic or clinical reasons and others who withdrew on their own were readmitted and included in the study, others did not return and no information is available on these individuals.

Finally, a post-study issue has arisen. In September 1991, a new, collaboratively developed curriculum was implemented at the program involved in this study in conjunction with two other hospital-based and two college-based nursing diploma programs in Edmonton and Red Deer as well as the Faculty of Nursing, University of Alberta. This may limit the generalizability of the study's results. Nevertheless, the results provide useful information about student selection for nursing programs with similar curricula and will be of interest generally to nursing education administrators and faculty, as well as those involved in selecting students for nursing education programs.

# CHAPTER 11

## Review of the Literature

A review of the literature regarding student success, predictive factors of success and selection procedures reveals a variety of ways by which post-secondary institutions have attempted to improve the process of screening and selecting candidates for educational programs. However, "student selection is an imperfect science. No institution has found the perfect recipe for selecting students; future academic performance behaviour has an unpredictability that can not be eliminated by the excess application of multiple criteria" (Jasper, 1988, p. 13).

The literature documents that the challenge of selecting candidates most likely to succeed in post-secondary health care programs has been experienced in at least the United States (Rezler, 1983), Scotland (Lucci & Brockway, 1980), England (Straw, 1981), Australia (Rosenthal, 1980) and New Zealand (Long & Gordon-Crosbie, 1981). Those involved in student selection in medical schools, occupational therapy programs (Lucci & Brockway), allied health education in general (Rezler), dental faculties (Chen, Podshadley & Shrock, 1967) and physical therapy programs (Gramet & Terragina, 1988) have all faced similar dilemmas.

In addition, "predicting success in nursing programs is complicated by multiple routes to becoming a registered nurse" (Rezler, 1983, p. 217). Most of the nursing literature is based on American data obtained from two-year college associate degree and four-year baccalaureate degree programs. In Canada, nursing education programs include two-year college and two-plus to three-year hospital-based diploma programs and four-year basic baccalaureate programs offered at most universities. The city of Edmonton is something of an anomaly having three hospital programs. Over the past two decades in Canada, most hospital-based nursing programs have been discontinued and replaced with shorter, college-based ones.

## Background

Educators are generally interested in various aspects of students' cognitive, affective and/or psychomotor domains. It has been suggested that a person's cognitive domain may be assessed using academic records, standardized cognitive tests, I.Q. rating, creative thinking/problem solving tests and biographical data. The affective domain data may be obtained from letters of recommendation, interviews, applicant essays/autobiographies and standardized personality/interest/value tests. Quantifying these is perhaps the biggest challenge in student selection. The psychomotor domain, the most neglected, may be assessed through tests of spatial perception, hand-eye coordination and gross motor skills (Dietrich, 1981). Dietrich describes a weighting mechanism to prioritize the three domains (e.g., cognitive 60%, affective 30% and psychomotor 10%). In addition, she suggests a system of merits (e.g., a previous degree) and penalties (e.g., an evident pattern of withdrawals and/or course repeats) that could be used in student selection.

Researchers have attempted to identify relationships or correlations between students' various cognitive/intellectual abilities, personality traits and demographic data, and students' success in various academic endeavours (Hart, 1990). The first three are predictor variables and the latter are criterion variables.

## Variables

Commonly, predictor variables in the literature include demographic factors, academic criteria, assessment test data and information based on references, essays/autobiographical letters and interviews. Demographic factors have included age, gender, racial origin, marital status, previous post-secondary education, relevant work experience, lapsed time since high school and commuting distance to campus. Academic criteria have included high school rank, grades in particular high school subjects that have relevance to nursing (e.g. mathematics, chemistry, biology and English) and high school average. Assessment test data have included the Scholastic Aptitude Test (S.A.T.), the College Admission Test, the American College Test (A.C.T.), the Davis Reading Test, the Purdue High School English Test, The Watson-Glaser Critical Thinking Appraisal, the Differential Aptitude Tests (D.A.T.) and a host of in-house tests.

Criterion variables in the literature have included students' performance in their nursing programs; on the National Council Licensure Examination for Registered Nurses (NCLEX-RN), the State Board Test Pool Examination (SBTPE) (the forerunner until 1982 of the NCLEX-RN) or the Canadian Nurses Association Testing Service (CNATS) examination; and as practising graduates. The range of both predictor and criterion variables used by researchers has led in part to mixed, inconclusive and often conflicting results in the literature. Because nursing programs differ from one another in admission/selection criteria, courses taught, program length, number of in-house versus university courses in the program and clinical time provided, it is important to establish predictors of success for this particular hospital-based nursing diploma program.

### Demographic factors

These have been studied in relation to their predictive value and studies have produced conflicting results.

Age. Research results range from no correlation between age and success on NCLEX-RN (Felts, 1986; Woodham & Taube, 1986) to a positive one ($r = .45$, $n = 905$, $p = .00$) between age and nursing students' G.P.A.'s (Petty & Todd, 1985), to older graduates having higher passing rates on both the NCLEX-RN and SBTPE (Quick, Krupa & Whitley, 1985a; Froman & Owen, 1989). Aldag and Rose (1983) also found that the proportion was significantly higher of older students who graduated and passed the SBTPE (of $n = 511$

students who were 20 years of age or older, an average of 93.8%) when compared with younger students (of n = 276, 82.1%). In researching student nurse attrition in five American college programs, Maxson-Ladage (1985) found that students who withdrew were somewhat younger (average 27 years) than those who graduated (average 28 years).

Marital status, dependents and relevant experience. Maxson-Ladage (1985) also found that age, number of children, marital status and years of work experience had little influence on students' success or failure. This is similar to the research results of Felts (1986) who found the relationship between experience as a licensed practical nurse (LPN) and performance on NCLEX-RN non-significant. Another researcher (Oliver, 1985) investigated the relationship of selected admission criteria to the academic success of associate degree nursing students. A number of Oliver's predictor variables were used in the present study (i.e., grades in specific high school courses, gender, age, marital status, previous experience as an LPN and previous college attendance). Older students with previous college experience and attending school part-time were found to be more successful (Oliver).

Other demographic variables. In a recent Ontario study, Abel (1990) found that the following variables negatively effect students' success in post-secondary education: being 20 years old when combined with other variables, being male, applying after March for fall admission, attending school on a student visa, travelling more than one hour each way to school and working more than 20 hours a week. Nursing education researchers have found several factors that identify students at risk for academic difficulty. These include having pre-admission D and F grades, withdrawals from courses, fewer pre-requisites completed at admission and a large number of course credits without having a degree. In addition, being male was related to risk of failing the program's clinical component (Allen, Higgs, & Holloway, 1988).

Variables having a positive effect on students' success included: meeting the instructor prior to registration; having completed grade 13; being out of high school three or more years; having completed high school mathematics, English and science (chemistry, not biology, for health science programs); being accepted into the program of the student's first choice; and intending not to work (Abel, 1990). In addition, what was said to and experienced by students on the first day, in the first week and first semester seemed particularly important in facilitating the success of students. Abel (1990) pointed out that the chances of a student graduating on time who failed even one course in the first semester was only nine percent. Of nursing students included in this research, only 50% graduated on time.

Of particular significance was a question dealing with students' attitudes. Those confident of their success, anxious to get started and looking forward to an exciting career were the most successful (Abel, 1990). These findings infer that some degree of maturity is an asset when pursuing post-secondary education, as are some life and work experience. A central application/registration system such as the one in effect in Ontario may also facilitate more students gaining entrance into the program of their first choice. In addition, orientation for new students seems to be an important factor in their eventual success.

Summary. The foregoing validates some earlier findings that age, employment status and certainty of career goals are significantly related to course performance. Further, high school grades and aptitude test scores were good predictors of program success and biology, advanced nursing course grades, overall G.P.A. and achievement test scores were good predictors of success on the NCLEX-RN (Capoor, 1982). In a subsequent evaluation study, Capoor (1983) suggested that it would "cost half as much to produce a qualified nurse when educating a student who met the selective admission criteria as it did when working with those who did not" (abstract).

### Academic Criteria

High school rank. While information on high school rank is not usually available in Canada, it has been used by some researchers in the United States. Contrary to Seither's (1980) findings, Glick, McClelland & Yang (1986) found no statistical significance between students' high school rank and any of the criterion variables (i.e., grades of required clinical nursing courses, cumulative nursing grade point average and NCLEX-RN scores) used in their study of 51 baccalaureate nursing students. These differences may be due to the studies using different dependent variables, the SBTPE and the more current NCLEX-RN respectively. Woodham and Taube (1986) also found students' high school rank non-significant (r = .0886) when investigating the records of 107 associate science in nursing degree (ADN) students.

High school average. Another study of 697 student nurses enroled in five different programs found that drop-out students in three of the college programs had slightly lower high school grade point averages (G.P.A.'s) than those who remained in their programs: 2.60 and 2.94 respectively (Maxson-Ladage, 1985). Grading system information is not included in her study, but these G.P.A.'s may be out of 4.0. Using a sample of 296 baccalaureate nursing students, other researchers found that pre-admission G.P.A. (all courses completed prior to application submission) and pre-requisite G.P.A. (courses specifically identified as nursing major pre-requisites) were the best predictors (r = .55 and r = .53 respectively) of program success (Allen, Higgs, & Holloway, 1988).

In an American study of 418 students enroled in a nursing diploma program, high school G.P.A. was found to have little predictive validity for achievement on the NCLEX-RN, but nursing school G.P.A. did (Crane, Wright & Michael, 1987). Other researchers used a sample of 155 baccalaureate nursing students to replicate an earlier study that used a set of four short test instruments (Witkin's Group Embedded Figures Test, Extended Range Vocabulary Test, Inference Test and S.A.T. Verbal). Based on their results, they recommend that some configuration of pre-requisite G.P.A. (including sciences and an English or other course measuring verbal ability) and a required verbal S.A.T. or A.C.T. score be used by schools of nursing when selecting students. This combination predicts baccalaureate nursing success (i.e., the highest number of accurate predictors with the lowest number of variables) (Wold & Worth, 1990).

High school courses. Specific high school courses have also been used as predictor variables. A strong correlation was found by several researchers between high school biology and G.P.A. in a nursing program, but not with NCLEX-RN scores. In the study by Glick et al. (1986), biological sciences ( i.e., animal biology, microbiology, human anatomy and physiology) had the second highest correlation coefficient ($r = .69$, $p<.001$, $n = 50$). In predicting academic success based on her sample of 141 ADN students, Oliver (1985) found that high school biology was a significant predictor for students' first quarter G.P.A. ($r = .3209$, $p<.01$) and English 12 was for program completion when successful/nonsuccessful groups were compared using t-tests. O'Brien (1986) found that students' biology G.P.A. was a predictor of their ability to use the nursing process in the clinical area ($r = .23$, $p<.000$, $n = 164$) and of uninterrupted program completion (74% predictive accuracy on discriminative analysis).

Some researchers found high school chemistry failed to correlate with success (Glick et al., 1986; Quick, Krupa & Whitley, 1985b), while others found that it was the best predictor of graduation from a college nursing diploma program (Maxson-Ladage, 1985) and found a strong correlation between it and success (Hayes, 1981). Students who failed the SBTPE, however, were found to have lower admission science G.P.A.'s (Whitley & Chadwick, 1986). In addition, pre-admission high school G.P.A.'s and liberal arts course grades were found in other research to be reliable predictors ($p<.001$) of success generally (Felts, 1986).

Pre-nursing courses. For a sample of 139 baccalaureate nursing students, their pre-admission G.P.A. in liberal arts courses and the number of credit hours earned pre-admission predicted success on the Psychiatric Nursing part of the STBEP (r = .73 and r = .76 respectively). The number of credit hours earned pre-admission also defined success for Medical Nursing (r = .73). Pre-nursing G.P.A. and biological G.P.A. (i.e., biology, microbiology and human anatomy and physiology) correlated strongly (r =.51, p<.01, n = 51 and r =.59, p<.01, n = 50 respectively) with clinical nursing G.P.A.'s, but not significantly with NCLEX-RN results (Glick et al., 1986). In a later study of 210 baccalaureate nursing graduates, these researchers obtained similar results. In addition, the two former predictors correlated strongly with nursing G.P.A. (r = .56, p<.01, n = 195 and r = .65, p<.01, n = 197 respectively) (Yang, Glick, & McClelland, 1987).

O'Brien (1986) examined selected academic aptitude/achievement variables to determine effective predictors of student success in an associate degree nursing program. She found that pre-nursing G.P.A. was the most effective predictor for students' success on the NCLEX-RN (r = .24, p = .000, n = 164). In addition, she found that ethnicity (i.e., being white as opposed to black ) was significant. Of the 32% of black students in the program investigated, 78% were unsuccessful.

Introductory nursing courses. Other researchers found a positive correlation between students' anatomy and physiology grades and NCLEX-RN performance (Quick, Krupa & Whitley, 1985b). Later this same group (Krupa, Quick, & Whitley, 1988) found, using discriminate analysis for the data of a sample of 384 BSN graduates, that Introduction to the Process of Nursing was the best predictor of NCLEX-RN success. Success in introductory nursing courses was found to be "related to a student's ability to read, write and understand fundamental concepts of anatomy and physiology" and "to a lesser extent, to perform basic mathematical operations" (Spahr, 1987, p. 8). If students do not enter the program with these skills, it is imperative that the skills be developed quickly after admission. As a result, the researcher recommended the college involved implement "comprehensive pre-admission assessment programs, review high school transcripts and other records of previous academic work more closely ..." (Spahr, p.7).

Nursing courses. Felts (1986) found, among other results, that the following variables yielded significant discriminations (at $p = .000$ for steps 1 to 5) between the pass/fail groups on the NCLEX-RN in her study of 121 A.D.N. students: microbiology, anatomy and physiology, sociology, child psychology and English 1. In examining the relationship between nursing program predictors and success on the NCLEX-RN for 107 students in an ADN program, Woodham and Taube (1986) found that outstanding program achievement predicted outstanding NCLEX-RN scores, that average program achievement predicted average NCLEX-RN scores. Variables with the highest correlations were a course dealing with biopsychosocial concepts related to adaptive/maladaptive responses of persons with nutrition and elimination needs ($r = .6676$, $p<.001$), a course focusing on communication concepts associated with chronic problems ($r = .6645$, $p<.001$) and an introductory course that provided a conceptual overview of subsequent nursing courses ($r = .6574$, $p<.001$) (Woodham & Taube).

Grant (1986), in reviewing the literature on predicting academic success in nursing, suggested that although prior achievement predicted future success, reading skill was also important. There may also be critical variables yet to be clearly identified which enable a student to succeed. In fact, "future success is dependent upon multi-variate phenomenon" (Grant, p. 100).

Summary. Caution must be used if relying on traditional cognitive measures when screening non-traditional applicants like adults and minorities (Dietrich, 1981). Sternberg (1985a, 1986) suggests there are three types of intelligence: componential, experiential and contextual. The first is the ability to interpret information in a hierarchical, taxonomic way in defined, unchanging contexts and those who have it do well on standardized tests. The second is the ability to interpret information in changing contexts and be creative; this is not measured by standardized tests. The third is the ability to adapt to changing contexts, to handle and negotiate the system. Nursing requires all three kinds of intelligence. Unfortunately, higher education admission systems tend to concentrate on the first and to measure it with standardized tests. Although academic criteria are important, combining them with students' results on assessment tests is more predictive of subsequent academic performance (Quann, 1979).

### Cognitive Assessment Data

Standardized cognitive tests can further evaluate the abilities of applicants who submit academic records from different institutions and may detect grade inflation (Dietrich, 1981). While in Canada standardized entrance examinations (e.g., LSAT,MCAT, GMAT, GRE, Miller's Analogy, etc.) are more common in graduate and professional programs, many American post-secondary institutions utilize them more generally and this is reflected in the literature. However, "no nationally available objective instrument is currently recognized as predictive of successful nursing program completion" (Bauwens & Gerhard, 1987, p. 278).

The American College Test. While composite scores on the A.C.T. were the best admission predictors ($p<.001$) of success in nursing courses, the research data used by Felts (1986) did not establish a relationship between nursing course grades and NCLEX-RN results. Glick et al. (1986) did not find a strong correlation between A.C.T. scores and final program marks, perhaps due to a small sample size of 51.

Later research using 210 baccalaureate nursing graduates identified ACT social science as the best predictor (r = .48, p<.01, n = 204) on the NCLEX-RN (Yang, Glick, & McClelland, 1987). Scores on entrance examinations (SCAT verbal and math and A.C.T.) were lower for non-graduating/
unsuccessful nursing students in four of five college programs included in Maxson-Ladage's research (1985). It must be remembered that the A.C.T. Program has been found to have "an age bias that leads to an underestimation of the performance of older students" (Aldag & Rose, 1983, p. 69) and generally its scores predict success better for ADN students than for baccalaureate ones (Fearing, 1989).

The Scholastic Aptitude Test. Verbal scores on the S.A.T. were found to correlate strongly with success on NCLEX-RN examinations (Quick, Krupa & Whitley, 1985b - r =.5910, p<.0001, n = 182; Whitley & Chadwick, 1986; Woodham & Taube, 1986 - r =.6268, p<.01, n = 104). SAT verbal also predicted the 15 - course theory G.P.A. (r = .354, p<.01, n = 57) in another study (Wold & Worth, 1990).

The College Level Academic Skills Test. The results on this test (which assesses the ability to read comprehensively, to write a sentence clearly and concisely, and to conceptualize and analyze at a basic level) and age have been found to correlate positively ($r = .6911$, $p<.005$, $n = 55$) with licensure examination scores (Safian-Rush & Belock, 1988). However, the small sample size used in the research may have effected the results.

The Watson-Glaser Critical Thinking Appraisal. The ability to think critically, make clinical judgments and life-saving decisions, and solve complex problems are important attributes for student nurses to develop and possess in their professional careers (Tiessen, 1987). An investigation into the use of the Watson-Glaser Critical Thinking Appraisal to predict success in a baccalaureate nursing program found that while the instrument was "not a valid measure of specific cognitive processes underlying the Nursing Process" (Bauwens & Gerhard, 1987, p. 278), there was support for its usefulness as a potential pre-admission predictor of success ($r = .31$, $p<.002$, $n = 177$). Tiessen, however, using the data of 150 baccalaureate nursing students, found low, positive correlations between the Watson-Glaser and the S.A.T. quantitative score ($r = .38$, $p<.05$), the S.A.T. verbal score ($r = .33$, $p<.05$), G.P.A. ($r = .32$, $p<.05$) and the total number of credit hours students had in the arts and humanities ($r = .30$, $p<.01$).

The Differential Aptitude Tests. More recently, in Canada, the combined score of verbal reasoning and numerical ability on the D.A.T. (based on Canadian norms) was found to be the most consistent predictor of performance across 28 varied college programs. This predictor variable was among the top three predictors in 13 regression equations and among the top five in 19 others (Jasper, 1988). While multiple criteria are used for selection purposes in most programs, "increasing the number of admissions variables does not result in improved predictions of student academic success" (Jasper, p. 12).

The Mosby Access Test. Several studies included students' results on the Mosby Access Test as an independent/predictor variable. Significant positive correlations were found in one study of 136 baccalaureate nursing graduates between pre-entrance test scores on S.A.T. total ($r = .577$), and verbal ($r = .610$) as well as cumulative G.P.A. ($r = .585$); Mosby Access Test ($r = .701$); nursing theory ($r = .547$) and NCLEX-RN performance ($p<.001$) (McKinney, Small, O'Dell

& Coonrod, 1988). The same investigators found little evidence that age, gender and Type A personality were predictive of nursing abilities. By using multiple regression and Pearson product moment correlation analysis, pre-entrance test scores, G.P.A., Mosby Access Test scores and courses repeated were found to be significant predictors of NCLEX-RN success (McKinney et al.).

In an ex post facto study designed to identify predictors of success on the NCLEX-RN, other researchers found that of a number of variables, nursing theory courses in the junior and senior years and the Mosby Assess Test strongly correlated ($r = .730$, $p<.0001$, $n = 407$) with NCLEX-RN performance (Jenks, Selekman, Bross & Paquet, 1989). In similar research using a sample of 156 associate degree nursing students, McCreary (1986) found that of A.C.T. English, math, social science, natural science and composite scores; high school G.P.A.; college G.P.A.; anatomy and physiology average; and the Mosby Assess Test score, the latter made the greatest contribution ($r =.768$, $p<.001$) to students' success on the NCLEX-RN. College G.P.A. ($r =.722$, $p<.001$), A.C.T. social science ($r =.494$, $p<.001$), A.C.T. composite score (r

=.494, p<.001) and A.C.T. natural science (r =.444, p<.001) were also significant predictors (McCreary).

The Comprehensive Nursing Achievement Test. Other research to identify predictors of success on the NCLEX-RN confirmed the usefulness of the Comprehensive Nursing Achievement Test. In addition, the best indicator of success was the student's performance in second-year nursing courses. However, age, math and reading admission scores did not predict success (Balint, 1988).

### Other Assessment Tests

Personality. In predicting G.P.A. and nursing school graduation as a function of personality factors, Zagar, Arbit and Wengel (1982) found that for their subjects (570 students with a mean age of 17.5 years in a 3 year hospital-based nursing diploma program) using the Minnesota Multiphasic Personality Inventory (MMPI), personality scales held little promise as predictive variables of academic success. However, empathy is considered an important characteristic for nurses to possess. Using the Paired Hands Test (P.H.T.) and ratings by freshmen students' clinical instructors, Fakouri (1982) found a positive relationship, especially for those students with low scores. These results suggest that the P.H.T. might be helpful in predicting certain personality characteristics and thus be of use in making admission decisions (Fakouri).

Interest inventories. Another study of nearly 1000 sophomore nursing students evaluated the ability of achievement scores (A.C.T.), university grades and inventories (Strong-Campbell Interest Inventory, California Psychological Inventory and Biographical Inventory) to predict success in college and the working world (Dyer, 1987). The A.C.T. scores were not found to be predictors (i.e., did not enter any of the regression equations as a predictor), while "self-reports from the Biographical Inventory describing academic achievement in high-school science courses were the best predictors of nursing and university G.P.A." (Dyer, p. 668).

Summary. Although the majority of withdrawing student nurses lack academic ability, neither high school G.P.A. or entrance exam scores consistently predict correctly, so other factors must influence students' success or withdrawal (Maxson-Ladage, 1985). "Noncognitive variables should be used in higher education admission. They have demonstrated validity in predicting student success and retention rates, particularly for minorities" (Sedlacek, 1989, p. 2).

### References, Autobiographical Letters/Essays and Interviews

In the past, written references, personal interviews and qualitative judgements significantly influenced selection decisions in allied health and nursing programs. Recently, there has been a shift in emphasis to academic criteria, perhaps reflecting a changing concept of the nursing profession (Rezler, 1983). A descriptive study that identified differences in educational content between four college diploma programs and the University of British Columbia's generic baccalaureate program in nursing found that admission criteria for the university were primarily academic while the colleges had fewer academic requirements, and more diversified admission criteria (Zabawski, 1983).

References. Letters of recommendation and individual admission interviews are used more widely by private institutions and graduate and professional programs than by public institutions or undergraduate programs (Quann, 1979). Using a standard reference form and specifying who can provide the reference would allow for some comparison between and among applicants (Hart, 1990). In her interview manual, Kohn (1985) suggests that preference be given to references from employers in health care related facilities and other former employers. The credibility of the reference would be enhanced if it by-passed the applicant and was sent directly to the institution. Currently, this is part of the application process of the institution being studied.

Autobiographical letters/essays. McMaster University School of Nursing uses an autobiographical letter as one component of its admission process (Brown, Carpio & Roberts, 1991). Applicants are asked to describe their personal qualities, reasons for applying and compatibility with the program's aims/objectives. The "letter is used to screen and select applicants for a team interview" (Brown et al., p. 12) which reveals those who do not personally compose their letter. Although labour and resource intensive, this admission process facilitates the selection of candidates who will succeed academically and professionally in a curriculum based on small-group, self-directed and problem-based learning (Brown et al.). Researchers have also found an applicant's essay to be the strongest predictor (r = .34, n = 117) of academic achievement in an occupational therapy program when compared with various academic criteria, cognitive assessment tests and interview scores (Berchulc, Wade & Seidner, 1987).

Interviews. In a national study of student selection practices in the allied health professions, it was found that programs used prior academic performance to assess candidates' cognitive abilities and interviews to evaluate their non-cognitive traits (Dietrich & Crowley, 1982). Interviews could "determine and clarify the extent and nature of applicants' nonacademic achievements" (Rezler, 1983, p. 223). In addition, interviews could "provide applicants with accurate information about the health professions since misconceptions often result in loss of interest and subsequent failure or attrition" (Rezler, p. 223).

More recent research into a selective admissions process for a physical therapy degree program found that qualitative measures such as interviews were the best predictors of successful completion while certain traditional quantitative variables were not (Gramet & Terragina, 1988). In another study with a sample size of 67, it was surprising that nursing faculty predictions (based on a review of the applicant's achievement record and a personal interview) were significantly correlated with academic success in the applicant's first quarter (r = .365, p<.01) and with program completion (r = .337, p<.01) (Oliver, 1985). Both observable (e.g., age, adequate finances and health) and perceived characteristics provide information on applicants. The latter can be gleaned via selection interviews.

The complex cognitive skills needed for patient assessment can be measured by responses to questions and situations posed during an applicant's interview as well as by standardized tests (Dietrich, 1981). In fact, "the small group selection interview provides an opportunity to observe applicant behaviour under conditions similar to that of the target occupational setting" (Shepard, 1980, p. 87). Unlike one-to-one interviews, in the small group ones, applicants meet new people, are asked to problem solve on the spot, demonstrate their verbal and non-verbal communication skills, are expected to state and explain thoughts and actions, need to listen carefully and respond appropriately - all under similar time constraints and some of the stress that their professional career will demand of them (Shepard).

Recognizing that the number of applicants always exceed the number of student positions available and the challenges facing those involved in student selection for nursing programs, Kohn (1985) developed an interview manual to assist faculty involved in this process. It includes examples of evaluation forms, sample interview questions and guidelines for the interview process. Based on the philosophy that to be successful in nursing, students must possess social skills, have a positive self-concept and be motivated, Kohn describes how these characteristics can be evaluated and measured in an interview. Perhaps fewer students apply to the college where she teaches as she suggests that ideally three or four faculty members conduct the selection interview with each applicant. This would be impossible for the program in this study given the hundreds of applications received each year.

Motivation and other influencing factors. Petty and Todd (1985) found that applicants' motivation, maturity, realistic expectations, attitude and people skills assessed during the interview positively correlated with student G.P.A. Also. values and interests related to work and leisure activities influence motivation (Rezler, 1983), motivation is a precondition for learning and it influences students' learning style and performance. In another Canadian study, Fogel (1990) found that among newly admitted full-time college students surveyed, the top three motivational priorities for combined faculties were qualifications for job opportunities, knowledge for job performance, and personal challenge and self-development. When the data were analyzed by gender, the second and third priorities were reversed for females (Fogel).

### Clinical considerations

Standard academic predictors used for student selection fail to predict clinical performance in allied health, dentistry, medicine, nursing and pharmacy professions (Rezler, 1983). "Prediction of clinical performance" and its key ingredients of application of knowledge and interpersonal effectiveness with patients "has been studied most extensively in medicine. Personality, value and attitude measures show the most promise for predicting clinical performance" (Rezler, p. 221).

## Recent Alberta Research

Interestingly, three Alberta studies have recently investigated predictors of success for students in two other nursing diploma programs (Hart, 1990; McFayden, 1989; Sharma, 1992). Sharma examined whether a significant relationship existed between admissions criteria (i.e., specific high school courses and high school average), socio-demographic characteristics (i.e., gender, regular/mature application and work history) and success (defined as completing the 96 week program on time). She also compared the classes admitted in September and January (total n = 170). A non-significant relationship was found between successful and non-successful student groups based on high school marks. There was also no significant difference between younger and mature (i.e., 21 years or over) students.

Although Sharma (1992) found no significant difference between high school marks and success in nursing school, there were significantly different mean scores on the t-test for particular nursing courses and success/non-success in the nursing program. These included Microbiology (t = 2.19, df = 165, p = .03), Psychology 261 (t = 2.10, df = 161, p = .04), Fundamentals 1 (t = 3.74, df = 163, p = .00), Nursing 319 (t = 2.82, df = 156, p = .04), Sociology 371 (t = 3.0, df = 166, p = .00), Anatomy and Physiology (t = 3.43, df = 167, p = .01), Advanced Physiology (t = 2.74, df = 157,p = .00), Pharmacology (t = 2.58, df = 157, p =.01) and Nursing 111 (t = 2.34, df = 152, p = .02). These courses were no doubt perceived as more relevant than high school ones and thus students may have been more motivated to do well in them.

Hart (1990) used a longitudinal approach to investigate the validity of existing entrance requirements for a college-based nursing diploma program in predicting student success on the CNATS examinations. He also looked for additional predictors of success. As his college was changing from a selective to a first come/first served admission process, it seemed important to establish minimal entrance requirements that could be validated as predicting student success in the nursing program.

In predicting nursing program G.P.A., Hart (1990) found that of required high school courses, English 30 showed the strongest correlation (r = .3901, p = .000, n = 241) followed by Chemistry 30 (r = .3544, p = .000, n = 212) and Biology 30 (r = .3197, p = .000, n = 223). In predicting success on the CNATS, the order of the last two was reversed. Of the other non-required high school courses, only Social 30 was significant and more so for the program G.P.A. (r = .4234, p = .000, n = 178) than for the CNATS (r = .2658, p = .000, n = 176). High school average of required courses was established as a predictor for both the program and CNATS (r = .4313, p = .000, n = 250; r = .3274, p = .000, n = 248). The average of the non-required ones was also, but less so (r = .3188, p = .000, n = 220; r = .1873, p = .003, n = 218). Previously taken college courses were significant predictors as follows for the program/CNATS: at p<.001, Psychology 260 (r = .5869, n = 105/r = .4526, n = 105) and 261 (r = .7090, n = 94/r = .6602, n = 94). Not surprisingly, all nursing courses in all years showed progressively stronger correlations with CNATS marks. The first year average's correlation was r = .5956 (p = .000, n = 312), the second year's was r = .6427 (p = .000, n = 310) and the third was r = .7055 (p = .000, n = 117).

Students' age was also a predictor of success. Students over 30 years of age achieved more than 30 marks higher than the average of the entire population on their CNATS examinations. Differences between students whose mother tongue was English and those for whom it was their second language were also significant ($t = 2.89$, $p = .004$). There was also a significant difference between the means of married and single students on the CNATS: 540.83 v.s. 508.96. His non-significant findings in relation to performance on CNATS examinations included students' entry status, country of citizenship, gender and the number of years students spent at college.

Hart (1990) suggests that with less homogeneous classes now entering nursing programs, those involved in screening and selecting students need to take a broad view of criteria rather than limiting selection to those with the highest grades. Other recommendations include increasing the required high school average from 60% to 70%, including Social 30 as a required course, administering some type of assessment tests and using the scores achieved by applicants as admission criteria, and improving program access to mature students.

McFayden (1989) examined which factors correlated with success on CNATS examinations using data from 211 hospital-based nursing students. She found that the best predictor of CNATS scores using 200 level courses was students' final program average. This accounted for 59.6% of the variance. Admission average predicted final program average, accounting for 26.7% of the variance, the personal profile variable increased this to 33.5%, Biology 30 to 35.9% and the mature student status variable to 37.7%. No other academic or demographic variables effectively predicted final program average or performance on CNATS examinations. She also found that students who wrote supplemental examinations in the program were at greater risk of failing their CNATS examinations than those did not write supplementals.

## Summary

> Both academic achievement and performance on state board examinations are predictable from prior academic achievement and, to some extent, from standardized aptitude and achievement tests. However, academic failure accounts for less than half of the dropouts from nursing schools . . . . The present tendency to use more cognitive tests

> more cognitive tests in selection may help to reduce academic attrition but will not affect that large group of students who quit for nonacademic reasons. Lack of realistic orientation to nursing and incompatibility between a student's personality and the learning environment have been the major causes of nonacademic attrition. (Rexler, 1983, p. 219)
>
> Students with the highest scores on cognitive tests and the highest G.P.A. from college may not become superior health professionals . . . . Validating selection procedures by using a criterion that reflects only superior classroom performance, as measured by written examinations, excludes from consideration student behaviours related to patient care . . . . Instead of selecting the highest scoring students, minimal entrance test scores should be defined by each school to satisfy academic requirements. (Rexler, 1983, p. 222)

In addition, developing a reasonably broad list of relevant criteria might ensure applicant equity and assist in the challenge of multiple-domain (i.e., applicants (Dietrich & Crowley, 1982).

Clearly, predicting students' post-secondary educational success, especially when the program involves a clinical component, as nursing does, is a complicated, complex process. The literature indicates no easy solution to the dilemma of selecting students most likely to succeed. In identifying success predictors for diploma student nurses in this program, this study will determine the significance of: various demographic data, pre-admission academic criteria and related variables, results on the Canadian Achievement Tests and the Test of Cognitive Skills, the interview rating and marks achieved in nursing courses.

# CHAPTER 111

## Methods and Procedures

An investigation was undertaken to determine the relationship between students' demographic information, pre-admission academic criteria and related variables, assessment test results and selection interview rating and their success in a 24 month hospital-based nursing diploma program. The scope of the research was narrowed somewhat from the original plan during the analysis stage to facilitate the project's completion.

## Research Design

A longitudinal, retrospective, correlational research design was utilized. Descriptive analysis provided information on all of the study's 48 variables. Stepwise multiple regression analysis defined students' success in six semester 1 courses and semester 2, 3, 4 and 5 averages.

### Descriptive Analysis

Frequencies, percentages, means and standard deviations (among other statistics) were produced for the above four groups of predictor variables as well as for students' achievements in the program courses.

Pre-admission predictor variables. The pre-admission predictor variables used in this study included students' age; their gender and marital status; the number, if any, of their dependents and whether those dependents resided with the student parent; high school grades achieved in required subjects and recency of same; high school average; upgrading done, if any, prior to admission; previous post-secondary education and health care work experience; entry status (i.e., regular or mature if 21 years of age or over by registration day); results on level 19 of the C.A.T. and level 5 of the T.C.S.; and the rating given applicants for their group-style selection interview.

Program course variables. At the time of the study, first year courses included biological science (anatomy and physiology), interpersonal communication, nutrition, three introductory nursing courses, pharmacology, medical science, professional nursing, two educational psychology courses and microbiology. Second year courses included full year nursing and medical science courses, sociology of the family, pharmacology, professional nursing, and a growth and development course. Professional nursing was the only course in the fifth and last semester and the students wrote a comprehensive examination as well.

In addition, first year students applied their academic learning in the clinical areas of geriatrics, medicine and surgery two days a week for about six months. Second year students spent three days a week for nine months in the areas of medicine, surgery, psychiatry, obstetrics and paediatrics. Third year students spent approximately three of their last four months working full-time in a variety of clinical areas.

Variables not included. Other variables were considered for use in the data analysis, but were discarded for various reasons. The dichotomous categories of satisfactory/unsatisfactory used to evaluate students' clinical practice made discriminating statistically between students difficult. Also, few students are unsatisfactory clinically, so these numbers would be too small for analysis purposes. In addition, although students needed a varying number of rewrites up to the allowed three to pass their drug calculations examination by 100% each year, they invariably all managed to do so.

### Predictive Analysis

Pearson correlation coefficients determined the relationships between variables. A factor analysis of the correlations identified clusters of variables that defined several factors. Step-wise multiple regression equations were produced for the criterion variables of each of six semester 1 courses and students' averages at the ends of semesters 2, 3, 4 and 5 of the program. These equations identified success predictors for this diploma nursing program.

## The Setting

### The Institution

The School of Nursing where this study was undertaken has been in operation since 1909. For decades, it was a three year program with a large service (to the hospital) component. During the 1970's, the program was shortened by a few weeks. In the early 1980's, a major curricular revision based on the Roy Nursing Model (Roy, 1984) was implemented, the program developed more of an educational focus than a training one and the length of the program was shortened to 96 weeks/24 months. This new curriculum was offered in two 10-month years and an additional four months in the third year.

### The Faculty

The program had three administrators besides the director at the time of the study and all of them had master's preparation. Of the 30 - 35 nursing faculty members, all but two had baccalaureate degrees in nursing and two had master's degrees. No one in the school of nursing had a Ph.D. at the time of the study.

### The Applicants and Students

Annually, the School of Nursing accepts approximately 120 students into the first year of its program. For the past eight years (the duration of the author's employment with the institution) more than 400 and up to 650 applications have been received and processed each year for those student positions.

Prospective students seem undeterred by rising tuition costs, increased competition for entry and cyclical local employment opportunities. On the other hand, this program's setting is perhaps less intimidating for students accustomed to rural or small town settings and/or to small high schools than they would be by a large university campus. The residence attached to the School of Nursing is also convenient for some students. As well, students know there will always be work for nurses somewhere when they graduate and the starting salary for new graduates is attractive.

In addition, a shorter educational commitment compared with the university's four year baccalaureate degree in nursing makes career changing feasible for some individuals. Graduates of diploma programs in nursing can also pursue a post-basic degree in nursing on-site at most universities and by distance education through Athabasca University (located in Alberta). These reasons and the fact that this program has enjoyed the reputation of providing excellent nursing education with its emphasis on clinical application and practice may explain prospective students' interest.

## The Sample

The sample in this study consisted of students admitted to the nursing diploma program in September 1985, 1986 and 1987. These groups are referred to respectively throughout the study by their graduation years as Class 1988, Class 1989 and Class 1990. The sample was a non probability, convenience one. Students' data was used in the study if they were members of the identified classes. As mentioned earlier, one student's data was discarded as she completed the first year of the program in two years as a part-time student.

## Research Instruments

Three instruments were used in the study: the Canadian Achievement Tests (level 19), the Test of Cognitive Skills (level 5) and an in-house interview evaluation form. In addition, demographic information and pre-admission academic marks were obtained from students' individual nursing school records. Grades achieved in the program were obtained from examination record sheets maintained by the school for each class.

### Canadian Achievement Tests

Sub-section descriptions. Although not developed for adults, level 19 of this test has been shown to be an effective instrument for the selection and placement of students in community college programs (J. D. Ayers, personal communication, February 12, 1986). The 30-item reading vocabulary and the 40-item reading comprehension sections as well as the 25-item reference skills section of this test were selected for administration to applicants following their selection interview. The first section required students to recognize words with the same meaning, the opposite meaning and those with multimeaning. The second section measured how well students understood what they read. Total reading was a combined score of these two sections. The last section evaluated how well students used reference material. The spelling, language (mechanics and expression) and mathematics (computation, concepts and applications) sections of the C.A.T. were omitted to reduce the testing time to a manageable, reasonable length of time for one sitting.

Assessment of the C.A.T.. The C.A.T. (level 19) has incorporated both norm-referenced and criterion-referenced assessment of achievement. In the former, "an individual's score is interpreted by comparing it with the scores obtained by others on the same test" (Anastasi, 1988, p. 101). "Criterion-referenced testing uses as its interpretive frame of reference a specified content domain rather than a specified population of persons" (Anastasi, p. 101). The distributions on the C.A.T. are intentionally skewed to the left to maximize discrimination in the bottom half of the distribution thus identifying weaknesses and placing students more accurately than would a norm-referenced test with normal distribution (Ayers, 1985).

The Ninth Mental Measurements Yearbook provided an assessment of this test. A range of skills was tested by the complete battery of tests, although the number of items in each area may be insufficient to facilitate individualized programming (Whyte, 1985). As students' scores will be used as part of the basis for future selection rather than for placement or remediation, this limitation was not significant.

Norms for this test apply to Canadian schools using English for instruction. The norms were based on data from stratified random sampling of school districts by geographic area and degree of urbanization as well as random sampling of schools within districts having a high participation rate. However, separate norms by geographic region, sex or socioeconomic level were not found in publications. Also, a higher percentage of learning disabled, native and English-as-a-second-language individuals exist in the school population than in the sample (Whyte, 1985).

Content validity was established in part by the development and writing of category objectives designed to measure basic skills common to all curricula. Although some discrepancy among the norming results for mean grade score norms was found, it did not exist when medians are used. Reliability estimates (i.e., means, standard deviations and Kuder-Richardson 20 co-efficients) are provided in the test manuals (Whyte, 1985).

### Test of Cognitive Skills

Sub-section descriptions. This test was designed to assess students' academic aptitudes in four areas: sequences, analogies, memory and verbal reasoning. Each section in level 5 consisted of 20 test items and, unlike the C.A.T., the entire test was administered to interviewed applicants. The sequences section measured students' ability to comprehend a rule or principle implicit in a given pattern or sequence of numbers, letters or figures. Analogies measured the ability to see concrete and abstract relationships and to classify objects or concepts according to common attributes. Memory measured the ability to learn new information and recall it later. Verbal reasoning measured students' ability to discern relationships and reason logically. Total T.C.S. was a combination score of these four sub-sections. In addition to subtest data, a Cognitive Skills Index (C.S.I.), an overall measure of cognitive functioning derived from a student's average subtest scale scores and chronological age, was provided with the test results.

Assessment of the T.C.S.. Again, the Ninth Mental Measurements Yearbook provided an evaluation of this test. While the test manuals lacked technical information, they were found to be clearly written. One of the few current tests that included a memory subtest, this section was found to be more internal and face-valid than traditional tests. The verbal reasoning subtest contained types of items rarely found on common mental-ability tests. It emphasized the ability to reason and learn new information more than word knowledge and required inductive and deductive inferences from verbal premises. It appeared that great care was taken to minimize item bias. Norms were provided for scale scores, percentile ranks and stanines. However, available reliability and validity information was inadequate (Sternberg, 1985b).

### Test Administration

In this study, between two and one half and three hours were required for test administration (depending on the length of the break given applicants between the two tests). Questions on both the C.A.T. and the T.C.S. were multiple choice and students recorded their answers on computer answer sheets which were machine-scored locally.

The scoring company sent the school of nursing a printed report for each group tested as well as labels for students' files with their individual test data. The reported data included students' raw scores, scale scores, grade equivalent, national percentile and national stanine for the C.A.T. The T.C.S. reported data included students' scale scores, national percentile (grade), national stanine (grade), national percentile (age), national stanine (age), chronological age and C.S.I.

### Interview evaluation form

This in-house form has evolved over time based on the experience of previous faculty involved in the screening and selection of applicants to the program and the current literature. Its present form was designed by the two current co-interviewers (the registration officer and the student counsellor) of selected applicants to the nursing program in this study. This team began interviewing together in 1984 and that year each one filled out separate evaluation forms on applicants. The results were then compared and found to be nearly identical in most cases. Although a statistical analysis of inter-judge agreement was not performed, it was felt that the similarity between the interviewers' evaluations was sufficient to establish adequate reliability (Smith & Glass, 1987).

## The Selection Process

### Pre-screening

At the time of this study,the screening and selection process began with the registration officer reviewing the material submitted by applicants. This included the required application fee and application form listing high school and post-secondary information and work experience. A three page applicant questionnaire was also reviewed. It elicited information about how nursing was chosen and this program in particular, what other careers were considered, strengths and weaknesses, responsibilities anticipated in addition to those as a student, proposed financing of this education and whether working while being a student was planned, perception of the program's workload, and a checklist rating of their perceived interpersonal relationships with family and friends. In addition, once transcripts (high school and post-secondary) and the three required references were received, the candidate's overall desirability was determined. On those bases, the most promising ones were then invited to participate in a group-style selection interview.

### Selection Interview

The interviews were jointly conducted by the registration officer and the student counsellor with usually four or five applicants. Sometimes there were as few as three applicants or as many as six. The occasional individual interview took place if there was no way for the applicant to attend a group interview. The interview took approximately two hours and generally followed the same format with some flexibility for group process. After introducing themselves, the interviewers explained the purpose of the interview. Then they left the room and allowed the group about ten minutes to get acquainted so they would be able to introduce another group member. Once the introductions were completed, candidates were asked to identify their strengths and how those might be useful in nursing, their challenges and how they might overcome them. Questions were posed to elicit what they knew about the program in particular and nursing in general. One or two (depending on available time) moral-ethical dilemmas were presented and applicants were asked how they would respond. Applicants' questions were invited and answered. At the close of the interview, the assessment testing was explained and the selection decision process reviewed.

### Post-interview Evaluation

Following the interview, the registration officer and the student counsellor together reviewed each candidate's behaviour, responses and contribution to the group. They jointly filled out an interview evaluation form for each individual (see Appendix A). If the applicant's interview rating was over 65/85, a tentative acceptance decision was then made pending receipt of acceptable test results and any other outstanding information. Applicants who had not completed the pre-admission requirements were given a conditional acceptance. All applicants also required a satisfactory health assessment.

Besides the accepted or conditionally accepted applicants, 30 to 35 of the next best candidates who had been interviewed and tested were put onto a waiting list to fill in places left by applicants who withdrew over the summer for a variety of reasons. On average, about 25 individuals on this list would be offered a position in the class. At least 10% of the students accepted from the waiting list were considered less than ideal candidates.

## Data Collection

The C.A.T. and T.C.S. were administered by the researcher to the Class of 1988 shortly after students' admission in September 1985. Their results provided some baseline information for subsequent selection purposes. Students in Classes 1989 and 1990 had the tests administered after their selection interviews as part of the screening and selecting process by two different assistants (oriented and supervised by the researcher). The remainder of the data used for this study (identified earlier as predictor and criterion variables) were obtained from students' records and examination records maintained by the School of Nursing.

## Data Analysis

The study's data were analyzed using SPSS. To ensure the validity of the data analysis, a hard copy of the initial frequency data was checked for obvious errors (and there were several). The correct data was inserted using the original printout of C.A.T. and T.C.S. results and the identification number code sheet. Following this cleaning process, the frequencies were rerun to verify accuracy before proceeding with further analysis.

In the program's nursing and support courses, students were assigned percentage grades; in their university courses, they were given marks based on a 9-point scale. In order to define predictors of students completing semesters 2, 3, 4, and 5 in the program, the percentages were converted to the latter using the Grading System Guide (1989) in Appendix B. The data of Classes 1988 and 1989 were used for semesters 2 and 3 and that of Class 1988 for semesters 4 and 5.

Descriptive statistics were used to analyze students' pre-admission data and their achievements in the program's courses. Pearson correlation coefficients determined the relationships between variables. A factor analysis of the correlations identified clusters of variables that defined several factors. Step-wise multiple regression equations were produced for the criterion variables of each of six semester 1 courses and of semester 2, 3, 4 and 5 averages. These equations defined success predictors for the diploma student nurses in this program.

# CHAPTER IV

## Results and Discussion

In this study, the data retrieved from students' records were analyzed using descriptive and correlational methods. Initially, frequencies, percentages, means and standard deviations (among other statistics) were produced for the students' demographic data, pre-admission academic criteria and related variables, assessment test scores, selection interview rating and grades achieved in the program courses. This was done for the combined student sample of 351 as well as for each individual class (i.e., Classes 1988, 1989 and 1990) for which data was available. At the time of admission, there were 117 students in each class.

For the remainder of the analysis, the combined student sample was used. Pearson correlation coefficients determined the relationships between variables. As these coefficients differed from those used in the multiple regression equations due to the listwise deletion of missing data during analysis, they were omitted to avoid confusion. Although a factor analysis of the correlations identified clusters of variables that defined seven different factors, this analysis was also not included in the discussion for the same reason.

Finally, multiple regression equations were produced to identify variables that could predict students' success in various program courses and at particular points in the program. It should be noted that the sample size was not equal across variables because of listwise deletion. That is, any student with data missing for any of the predictor variables in the set of variables for a particular equation was automatically removed from that sample. Selected regression equations for 10 criterion variables of six semester 1 courses and semester 2, 3, 4 and 5 averages will be presented and discussed.

Some data, usually less than 5%, were missing for most variables for several reasons. More data were missing for a few variables and this will be explained later in the discussion. Some students were allowed to substitute courses deemed equivalent for those required for admission to the program. Others were given advanced credit for one or more courses and a few students withdrew from the program at different points for various reasons. Some of the students in this latter group were later re-admitted to the program. Also, the percentage range of the Grading System Guide (1989) (see Appendix B) used to convert students' program marks to the 9-point system was 50% to 100%. As a result, marks of less than 50% (or 2 points) were recorded as missing. In the entire sample, the data of two students for one course were involved. Missing data will not be commented on further in the discussion unless there are explanations for it other than the foregoing.

## Descriptive Analysis

### Demographic Findings

Demographic information obtained from students' records included students' age; their gender and marital status; and the number, if any, of their dependents. The data also included whether those dependents resided with the student parent.

Age. In the combined student sample, the age range was 17 to 47 years. Those who were 21 years of age or older by registration day were classified as mature students. The age range for Class 1988 was the same as the combined sample. For Class 1989, the range was 17 to 42 years and for Class 1990, it was 17 to 38. There was a more even split between mature students and younger students in the latter. One possible explanation for this difference lies in Chemistry 30 being made a required pre-admission course in 1987 (the year Class 1990 entered the program); perhaps more adult students than younger ones had not taken it. This information also confirms the trend of adults seeking further education and individuals making career changes. Table 1 provides a summary of this data.

Table 1

Students' Age Groups

| Data of: | Combined | | Class 1988 | | Class 1989 | | Class 1990 | |
|---|---|---|---|---|---|---|---|---|
| Age Groups | n | % | n | % | n | % | n | % |
| 17-20 | 138 | 40.6 | 43 | 35.9 | 41 | 37.3 | 55 | 48.7 |
| 21-25 | 111 | 31.7 | 43 | 36.7 | 35 | 29.8 | 33 | 28.2 |
| 26-30 | 41 | 11.6 | 11 | 9.5 | 14 | 12.0 | 16 | 13.7 |
| 31-35 | 28 | 8.0 | 12 | 3.5 | 6 | 8.6 | 6 | 5.2 |
| 36-40 | 17 | 4.8 | 5 | 4.3 | 9 | 7.8 | 3 | 2.6 |
| 41-45 | 3 | 0.9 | 2 | 0.9 | 1 | 0.9 | - | - |
| 46-50 | 2 | 0.6 | 2 | 0.9 | - | - | - | - |
| Missing | 11 | 3.1 | - | - | 7 | 6.0 | 4 | 3.4 |
| Total | 351 | 100.0 | 117 | 100.0 | 117 | 100.0 | 117 | 100.0 |
| Mean Years | | 23.4 | | 24.2 | | 24.0 | | 22.0 |
| Std. Dev. | | 6.1 | | 6.7 | | 6.1 | | 5.0 |

Gender. In the total sample, there were 311 female students (or 88.6% of the sample) and 27 males (or 7.7%). The former were coded as 1 and the latter as 2 for the purpose of analysis. As nursing has traditionally been considered a woman's profession, this distribution is not surprising. Analyzed by classes, there were 109 females and 8 males in Class 1988 (93.2% and 6.8% respectively). There were 102 females and 7 males in Class 1989 (87.2% and 6% respectively). In Class 1990, there were 100 females and 12 males (85.5% and 10.3% respectively). This trend of increasing numbers of men being interested in nursing as a career has continued and, in fact, increased to the present although they remain a minority.

Marital status. The findings for this variable are congruent generally with increasing numbers of older students pursuing post-secondary education and, in particular, nursing education. In addition, the marital frequencies in the Class of 1990 are congruent with its larger proportion of younger students. Table 2 provides details of these findings. The 'other' category includes students who identified themselves as living in a common-law relationship. Later, two variables were created to facilitate the analysis of students' marital status: marital 1 consisted of students who were not married at present and marital 2 of those who were presently married.

Table 2

Marital Status of Students

| Data of: | Combined | | Class 1988 | | Class 1989 | | Class 1990 | |
|---|---|---|---|---|---|---|---|---|
| Category | n | % | n | % | n | % | n | % |
| Single | 235 | 67.0 | 78 | 66.7 | 72 | 61.5 | 85 | 72.6 |
| Married | 74 | 21.1 | 31 | 26.5 | 27 | 23.1 | 16 | 13.7 |
| Separated | 12 | 3.4 | 3 | 2.6 | 4 | 3.4 | 5 | 4.3 |
| Divorced | 10 | 2.8 | 2 | 1.7 | 4 | 3.4 | 4 | 3.4 |
| Widowed | 2 | 0.6 | 1 | 0.9 | - | - | 1 | 0.9 |
| Other | 5 | 1.4 | 2 | 1.7 | 2 | 1.7 | 1 | 0.9 |
| Missing | 13 | 3.7 | - | - | 8 | 6.8 | 5 | 4.3 |
| Total | 351 | 100.0 | 117 | 100.0 | 117 | 100.0 | 117 | 100.0 |

Number of dependents. In this study, 22.5% of the students in the sample had the added responsibilities of being a parent while being a student. Parents resided with their children except in two cases. These students were either separated or divorced men whose former partners had primary custody of their children or women who lived in the city during the week to attend classes and went home on the week-ends to their families who lived out-of-town. The results show that fewer students in Class 1990 were parents and this is again congruent with the smaller proportion of older students in this particular class. Data for this variable were coded for analysis as follows: no children - 1, one child - 2, two children - 3, three children - 4, four children - 5, five children - 6. Table 3 summarizes the findings for this variable.

Table 3

Students' Dependents

| Data of: | Combined | | Class 1988 | | Class 1989 | | Class 1990 | |
|---|---|---|---|---|---|---|---|---|
| # of Child. | n | % | n | % | n | % | n | % |
| 0 | 259 | 73.8 | 86 | 73.5 | 80 | 68.4 | 93 | 79.5 |
| 1 | 19 | 5.4 | 3 | 2.6 | 8 | 6.8 | 8 | 6.8 |
| 2 | 37 | 10.5 | 15 | 12.8 | 13 | 11.1 | 9 | 7.7 |
| 3 | 14 | 4.0 | 6 | 5.1 | 6 | 5.1 | 2 | 1.7 |
| 4 | 8 | 2.3 | 7 | 6.0 | 1 | 0.9 | - | - |
| 5 | 1 | 0.3 | - | - | 1 | 0.9 | - | - |
| Missing | 13 | 3.7 | - | - | 8 | 6.8 | 5 | 4.3 |
| Total | 351 | 100.0 | 117 | 100.0 | 117 | 100.0 | 117 | 100.0 |
| Mean | | 1.5 | | 1.5 | | 1.6 | | 1.3 |
| Std. Dev. | | 1.0 | | 0.9 | | 1.1 | | 0.7 |

Realistic expectations. Applicants with some work experience in the health care field and/or who had previously been students in nursing or other health care programs (e.g., respiratory therapy) were often accepted into the program. It was assumed that this experience provided students with more realistic expectations of their nursing education and future nursing career. Experience in this category included work as a Registered Nursing Assistant/Licensed Practical Nurse, Nursing Aide/Attendant, unit clerk, health representative in a native community, Emergency Medical Technician, psychiatric aide/attendant, community health assistant and armed forces medic. Data for this variable were coded as 1 if students had the above work experience and 2 if they did not.

In the total student sample, 47 students or 13.4% of the sample were considered to have this experience. In Class 1988, 17 (or 14.5%) were categorized as realistic, in Class 1989 the number was 16 (or 13.7%) and in Class 1990, 14 (or 12%) were realistic.

Summary. Demographically, the typical student in this study was female and 23 years old (thus classified as a mature student). She was also single, without children and unlikely to have realistic expectations (as defined by the researcher).

## Pre-admission Academic Criteria and Related Variables

Data included in this group of variables were students' grades achieved in the high school courses required for admission to the program [i.e., English 30, Biology 30 and Chemistry 30 (recommended for

Classes 1988 and 1989, required for Class 1990)]; their high school average of three subjects for mature students and five for the other students; the recency of their high school studies; upgrading of high school marks done, if any, prior to admission; and whether they had any post-secondary experience and if so, had completed a diploma or degree prior to being admitted to the nursing program.

English 30. For the combined student sample, grades for this subject ranged from 50% to 92% with a mean of 69% and standard deviation of 7.70. By class groups, the range for Class 1988 was 50% to 90%, the mean was 69% and the standard deviation was 8.22. The range and mean for Class 1989 was the same as the combined sample and its standard deviation was 7.56. For Class 1990, students' grades ranged from 55% to 91% with a mean of 70% and standard deviation of 7.03.

Biology 30. In the combined student sample, students' grades in this subject ranged from 50% to 96% with a mean of 73% and standard deviation of 9.07. The range of grades for students in Class 1988 was 50% to 92% with a mean of 72% and standard deviation of 9.43. For Class 1989, the range was 51% to 93% with mean of 73% and standard deviation of 8.82. Class

1990 had a grade range of 59% to 96% with a mean of 74% and standard deviation of 8.89.

Chemistry 30. Until Class 1990 entered the program in 1987, this course was recommended, not required, which explains the large proportion of missing data in the two earlier classes and in the combined student sample. As noted earlier, it may also explain the higher proportion of younger students in Class 1990. For the latter, the range of grades in this subject was from 40% to 93% with a mean of 67% and standard deviation of 9.88. Data was missing for 77 students or 21.9% of the sample. The range for Class 1988 was 40% to 90% with a mean of 65% and standard deviation of 10.50. Data was missing for 34 students or 29% of the class. The marks for Class 1989 were somewhat higher with a range of 50% to 88% and a mean of 67% and standard deviation of 9.32. Data was missing for 39 students or 33% of the class. Class 1990 had a range of 50% to 93%, a mean of 69% and a standard deviation of 9.58.

High school average. The average recorded for this study was the students' blended mark when this was available. When departmental examinations were reinstituted in Alberta in 1983, students' transcripts from that date on identified their final school mark, departmental examination mark and the average of these or their blended mark.

For the combined student sample, the students' high school averages ranged between 55% and 91% with a mean of 71% and standard deviation of 6.20. Individual high school averages increased with each class in this study, although the class means remained fairly constant. For Class 1988, the range was 55% to 87% with a mean of 70% and standard deviation of 6.64. The range for Class 1989 was 57% to 87% with a mean of 71% and standard deviation of 5.85. The range for the high school averages of Class 1990 was 60% to 91% with a mean of 71% and standard deviation of 6.08.

Recency of high school. For the combined student sample as well as the individual class samples, the vast majority of students had completed high school within one to three years of being accepted into the nursing program. This information reflects not just younger students attending a post-secondary program upon completion of high school, but also adult students who recently completed course requirements or who upgraded earlier grades. The remainder of the students, 31.6% of the total sample, were the ones whose high school transcripts raised questions of comparative validity due to the lack of standard departmental examination information between 1972 and 1983 in Alberta. Data for this variable were coded as 1 if the student had completed high school in the past one to three years, 2 if completed in the past four to six years, 3 if completed in the past seven to 10 years and 4 if completed longer than 10 years before admission to the program. Data regarding this variable is found in Table 4.

Table 4

Recency of High School Completion

| Data of: | Combined | | Class 1988 | | Class 1989 | | Class 1990 | |
|---|---|---|---|---|---|---|---|---|
| Years | n | % | n | % | n | % | n | % |
| 1-3 | 240 | 68.4 | 71 | 60.7 | 77 | 65.8 | 92 | 78.6 |
| 4-6 | 56 | 16.0 | 25 | 21.4 | 21 | 17.9 | 10 | 8.5 |
| 7-10 | 20 | 5.7 | 5 | 4.3 | 7 | 6.0 | 8 | 6.8 |
| >10 | 24 | 6.8 | 16 | 13.7 | 5 | 4.3 | 3 | 2.6 |
| Missing | 11 | 3.1 | - | - | 7 | 6.0 | 4 | 3.4 |
| Total | 351 | 100.0 | 117 | 100.0 | 117 | 100.0 | 117 | 100.0 |

Upgrading of high school courses. Applicants often retake some of their high school courses to raise their marks and thus enhance their chances of being selected into post-secondary programs, especially those like nursing that have student quotas. Data for this variable were coded as 1 if upgrading had been done prior to admission and 2 if no upgrading had been done by students. In the total student sample, upgrading was done by 122 of 351 students (or 34.8% of the sample). In each of Class 1988 and 1989, 37 of 117 students (or 31.6%) upgraded their marks. In Class 1990, 48 of 117 students (or 41%) chose to do upgrading prior to admission.

Post-secondary education. Most students find they must approach studying and learning differently in post-secondary programs compared with high school in order to be successful. As a result, it was postulated that students with post-secondary education would do better in the program than those who lacked the experience. Students were identified who had some post-secondary education (i.e., had taken one or more courses, coded as 1, versus 2 if they had no such education) as well as those who had completed a diploma or degree (coded as 1, versus 2 if they had not done so) Some post-secondary education has been identified as 1 and completion of a post-secondary diploma or degree as in the discussion. The data for this variable is summarized in Table 5.

Table 5

Students' Post-secondary Education

| Data of: | Combined | | Class 1988 | | Class 1989 | | Class 1990 | |
|---|---|---|---|---|---|---|---|---|
| P-s Exp. | n | % | n | % | n | % | n | % |
| None | 180 | 51.3 | 69 | 59.0 | 55 | 47.0 | 56 | 47.9 |
| Some (1) | 160 | 45.6 | 48 | 41.0 | 55 | 47.0 | 57 | 48.7 |
| Missing | 11 | 3.1 | - | - | 7 | 6.0 | 4 | 3.4 |
| Total | 351 | 100.0 | 117 | 100.0 | 117 | 100.0 | 117 | 100.0 |
| Compl. (2) | 84 | 23.9 | 29 | 24.8 | 26 | 22.2 | 29 | 24.8 |

Summary. Regarding pre-admission criteria and related variables, the typical student entering this program during the time of the study had achieved 69% in English 30, 73% in Biology 30, 67% in Chemistry 30 (if it had been taken) and had a high school average of 71%. In addition, this student had completed high school within three years of entering the program, not done any upgrading and not taken any post-secondary education courses.

## Assessment Test Results

As mentioned earlier, the C.A.T. and T.C.S. results of Class 1988 were used as baseline data for subsequent class selections although cut-off scores per se have not been established. The analysis of students' scale scores for the subsections of each test and their total scores will be discussed as will their C.S.I.

C.A.T. reading vocabulary. For the combined sample of 351 students, scale scores for this section ranged between 498 and 839 with a mean of 719 and standard deviation of 67.21. The lowest value increased (i.e., 498, 530 and 562) with each subsequent class and the highest value, 839, remained constant for all three classes. The mean was 705 for Class 1988, 729 for Class 1989, and 723 for Class 1990. The standard deviations were 62.05, 68.58 and 69.39 respectively.

C.A.T. reading comprehension. The range of scale scores for this section was 508 to 861 with a mean of 700 and standard deviation of 64.09. There was less difference among the results between classes on this section. Class 1988's scores ranged from 541 to 813 with a mean of 688 and standard deviation of 60.70. Those of Class 1989 ranged from 508 to 861 with a mean of 712 and standard deviation of 67.64. The scores of Class 1990 from 541 to 861 with a mean of 701 and standard deviation of 62.16.

C.A.T. total reading. This is a combined score of the previous two sections. For the total student sample, the range was 546 to 894 with a mean of 715 and standard deviation of 63.80. For Class 1988, the range was 546 to 857 with a mean of 701 and standard deviation of 58.36. The results for Class 1989 included a range of 560 to 894 with a mean of 728 and standard deviation of 67.20. For Class 1990, the range for this variable was 581 to 894 with a mean of 717 and standard deviation of 63.63.

C.A.T. reference skills. The ability of students to use reference material was reflected in the results for this section. The combined student sample had a range of 476 to 860 with a mean of 705 and standard deviation of 72.60. Class 1988's range was identical, but the mean was 695 and the standard deviation was 67.77. The range for Class 1989 was 530 to 860 with a mean of 711 and standard deviation of 84.62. The results for Class 1990 ranged from 588 to 860 with a mean of 723 and standard deviation of 61.81.

T.C.S. cognitive skills index. This overall measure of cognitive functioning was derived from a student's average subtest scale scores and chronological age. The range in the combined student sample was 68 to 134 with a mean of 104 and standard deviation of 12.33. In Class 1988, the range was identical with a mean of 103 and standard deviation of 11.85. For Class 1989, the range was 68 to 130 with a mean of 105 and standard deviation of 12.00. The range for Class 1990 was 77 to 132 with a mean of 104 and standard deviation of 13.17.

T.C.S. sequences. This section measured a student's ability to comprehend a rule or principle implicit in a given pattern or sequence of numbers, letters or figures. For the combined student sample, the range was 465 to 966 with a mean of 718 and standard deviation of 96.08. The ranges for the individual classes were identical, but each had a different mean: 706 for Class 1988, 723 for Class 1989 and 726 for Class 1990. The standard deviations were 97.91, 90.69 and 98.88, respectively.

T.C.S. analogies. The ability to see concrete and abstract relationships and to classify objects or concepts according to common attributes was measured by this section. The range for the combined student sample was 429 to 979 with a mean of 744 and standard deviation of 86.68. For each class the lowest score was 572 (Class 1988), 429 (Class 1989) and 457 (Class 1990), but the highest score of 979 was identical for all three classes. The means for this test were 747, 745 and 740 and the standard deviations were 83.16, 88.73 and 88.84, respectively.

T.C.S. memory. This section measured a student's ability to learn new information and recall it later. For the combined student sample, the range was 483 to 973 with a mean of 765 and standard deviation of 119.04. The range for Class 1988 was 495 to 973 with a mean of 772 and standard deviation of 121.61. For Class 1989, the range was 495 to 940 with a mean of 778 and standard deviation of 115.25. Class 1990 had a range of 483 to 940 with the lowest mean of 745 and standard deviation of 118.52.

T.C.S. verbal reasoning. A student's ability to discern relationships and reason logically was measured by this section. The combined student sample had a range of 574 to 948 with a mean of 775 and standard deviation of 74.88. The ranges for Classes 1988 and 1990 were identical to the combined group, but their means were slightly different: 770 (Class 1988) and 774 (Class 1990). The standard deviations for these classes were 71.34 and 75.44, respectively. Class 1989 had a range of 602 to 948 with a mean of 781 and standard deviation of 78.13.

Total T.C.S. This score was a combination of the four subsections of the T.C.S. For the total student sample, the range was 559 to 907 with a mean of 751 and standard deviation of 60.58. The range for Class 1988 was 562 to 907 with a mean of 748 and standard deviation of 58.48. For Class 1989, the range was 562 to 871 with a mean of 757 and standard deviation of 59.04. For Class 1990, the range was 604 to 903 with a mean of 749 and standard deviation of 64.24.

Summary. In relation to the assessment tests used in this study, the typical student achieved 719 in reading vocabulary, 700 in reading comprehension and 709 in reference skills on the C.A.T. subsections. This student's total reading score was 715. On the T.C.S., the study's typical student had a C.S.I. of 104 and achieved scores of 718 on sequences, 744 on analogies, 765 on memory and 775 on verbal reasoning, giving a total T.C.S. of 751.

### Selection Interview Rating

The interview evaluation form used a 5-point Likert scale to measure several broad categories. Information was obtained from the interview itself as well as the student's application file (e.g., references, questionnaire, completeness of the file and follow-through with requests for information). The areas evaluated in the interview included appearance, communication, personal characteristics and program knowledge. In addition, bonuses like work experience, hospital/health related experience, post-secondary education, certification in C.P.R./first aide and parenthood were noted. Penalties were also listed (e.g., withdrawals from courses, course failures/repeats and health concerns). Summary comments were written and a tentative decision made (pending receipt of outstanding information and results of the assessment tests) by the interviewers about accepting the applicant (see Appendix A).

Most of the interview evaluation forms had previously been removed from the students' files of Class 1988 at the time the data for this study was recorded. As a result, only 12 students were included with the other two classes in the combined student sample. The interview ratings for this reduced sample of 234 ranged from 62 to 84 out of a maximum of 85 points. The mean was 73 and standard deviation was 4.43. Of the data available for 12 students in Class 1988, the range was 67 to 80 with a mean of 73 points and standard deviation of 3.39. For Class 1989, the range was 63 to 84 with a mean of 74 points and standard deviation of 4.53. Class 1990 had a range of 62 to 82 for their interview ratings with a mean of 72 points and standard deviation of 4.28.

Summary. This study's typical student was given an interview rating of 73 out of 85.

## Nursing Program Courses

As discussed in Chapter 3, data on how students did on their drug calculations tests and in their clinical practice each year were not included in the analysis. Other courses in the first year of the program at the time of this study included: Biological Science; Communication; Nutrition; Nursing Science 1, 11 and 111; Pharmacology 1; Medical Science 1; Professional Nursing 1; Educational Psychology 263 (later replaced with Psychology 261); Educational Psychology 271 (later replaced with Psychology 260); and Microbiology.

Second year courses included: Nursing 319, Nursing Science 1V (semester 1 and 2), Family Studies 350, Pharmacology 11, Professional Nursing 11 and Medical Science 11. Data from the last four months of Class 1988's 24-month program (referred to as third year) included their marks in Professional Nursing 111 and on a comprehensive examination.

Brief course descriptions are provided for each course. Courses with percentage grades were converted to the 9-point grading system to facilitate averaging students' marks at the ends of semesters. If students failed a final examination, but wrote and passed a supplemental one, the mark they achieved in the latter was recorded. Again, as previously mentioned, information was missing for approximately 5% of the combined student sample unless otherwise indicated.

Biological science. This course was an introduction to anatomy and physiology. It provided the student with knowledge about the human body and the organization of micro-organisms and their relationship to humans. This important, foundation course in the program often presented the most challenge to students and the course failures are evidence of this.

In the combined student sample, the range of marks for this course was 2 to 9 with a mean of 6.1 points and standard deviation of 1.26. Although six students were listed as course failures, there were also two others who achieved marks of less than 50%

(or less than 2) and thus were included in the missing data.

In Class 1988, the range was 3 to 8 with a mean of 6.1 points and standard deviation of 1.27. Two students failed the final examination, but passed the supplemental which allowed them to continue in the program. Of the three others who failed both examinations, two were later re-admitted to the program to repeat the course. The third student withdrew from the program.

For Classes 1989 and 1990, the ranges were 2 to 9 with means of 6.2 and 6 points and standard deviations of 1.23 and 1.28, respectively. Although only one failure was identified by the computer for Class 1989, there were two others who achieved less than a 2 and were listed as missing; all three were later re-admitted to repeat the course. In Class 1990, two students failed both the final and supplemental examinations and were also later re-admitted to the program.

Communication. In this course, students gained knowledge of communication principles and techniques. Learning opportunities were provided for one-to-one and group practice. This course apparently posed little difficulty for students.

For the combined student sample, the range of marks was 6 to 9 with a mean of 7.6 points and standard deviation of 0.93. In Class 1988, the range and mean were the same as the combined sample. The standard deviation was 0.79. In Classes 1989 and 1990, the range was 5 to 9, the means were 8.0 and 7.1 points and the standard deviations were 0.72 and 1.01, respectively.

_Nutrition_. This course introduced students to basic nutritional concepts. These included normal requirements, food habits, diet therapy and common variables affecting the maintenance of a healthy nutritional status. The content of this course was blended into other courses beginning September 1987 and so there was no data available for the Class of 1990.

In the combined data for the other two classes, the range was 5 to 9 with a mean of 7.3 points and standard deviation of 1.14. For Class 1988, the range was 6 to 9 with a mean of 8.1 and standard deviation of 0.58. In Class 1989, the range was 5 to 9 with a mean of 6.4 and standard deviation of 0.97.

Nursing science 1. In this course, students were introduced to Roy's Adaptation Model (Roy, 1984) and the nursing process as it related to the psychosocial aspects of individuals. In the combined student sample, the range was from 3 to 9 with a mean of 7.2 points and standard deviation of 0.93.

For Class 1988, the range was the same with a mean of 7.1 and standard deviation of 1.06. One student failed the final examination and passed the supplemental; another failed the final and withdrew from the program. The range was the same for Classes 1989 and 1990 (5 to 9), their means were 7.4 and 7.2 points, and standard deviations were 0.93 and 0.77, respectively. In Class 1989, two students who failed the final, passed the supplemental examination.

Nursing science 11. The focus of this course was assessment and maintenance of adaptive behaviours which promote physiological integrity using the adaptation framework, common nursing diagnoses and the nursing process. This course was not completed by Class 1990 at the time of data collection resulting in a reduced combined student sample (220) of Classes 1988 and 1989.

The range for this group was 5 to 9 with a mean of 7.2 points and standard deviation of 0.87. The range for Class 1988 was 6 to 9 with a mean of 7.5 and standard deviation of 0.71. For Class 1989, the range was 5 to 9 with a mean of 6.9 and standard deviation of 0.91.

_Nursing science 111_. In this course, students examined simple adaptation problems related to the biopsychosocial integrity of individuals. Influencing factors and nursing interventions were emphasized. The data for Class 1990 was also missing for this course for the same reason as for Nursing Science 11.

The mark range for this course in the combined student sample of Classes 1988 and 1989 was 5 to 9 with a mean of 6.8 points and standard deviation of 0.95. The range in each class was identical to the whole with some variation in the means: 7.1 in Class 1988 and 6.6 in Class 1989. The standard deviations were 0.92 and 0.94, respectively.

_Pharmacology 1_. This course introduced students to pharmacology and emphasized common drug classifications and their therapeutic use. The Class 1990 data for this course was missing for the same reason as above.

For the combined student sample of Classes 1988 and 1989, the range was 4 to 9 with a mean of 7.3 points and standard deviation of 1.04. Class 1988 had a range of 6 to 9 with a mean of 7.5 and standard deviation of 0.87. The range for Class 1989 was 4 to 9 with a mean of 7.1 and standard deviation of 1.16.

Medical Science 1. Students in this course learned about pathophysiological conditions, how these could alter biopsychosocial integrity and determine the medical management of individuals. The Class 1990 data for this course was missing for the same reason as for Nursing Science 11 and 111 and Pharmacology.

The range for the combined student sample of Classes 1988 and 1989 was 3 to 9 with a mean of 6.4 points and standard deviation of 1.21. Two students in Class 1988 failed the final examination; one passed the supplemental and the other withdrew from the program without writing it. In Class 1989, one student failed both the final and the supplemental and withdrew from the program. The range was the same in each class as in the combined sample although the means were slightly different: 6.5 and 6.3 respectively. The standard deviations were 1.24 and 1.17, respectively.

Professional nursing 1. This course provided an introduction to the nursing profession and the role of the nurse in the general health care system. The influence of historical context, current belief/value systems and concepts of accountability, responsibility and confidentiality on nursing practice were examined.

The range for the combined student sample in this course was 5 to 9 with a mean of 7.7 points and standard deviation of 0.68. In Class 1988, the range was 6 to 9 with a mean of 8.1 and standard deviation of 0.55. For Class 1989, marks ranged from 5 to 9 with a mean of 7.5 and standard deviation of 0.76. The range for Class 1990 was 6 to 9 with a mean of 7.8 and standard deviation of 0.61.

Educational Psychology 263/Psychology 261. The former, an introductory course, focused on understanding human behaviour as well as emotional, personality and social development. It was taken by Classes 1988 and 1989. The latter course dealt with maturation and learning and emphasized cognitive and physical development. It was taken by Class 1990. These courses were taught by University of Alberta faculty on site at the school of nursing. When Psychology 261 was introduced, it was offered in the second semester and thus the final marks for students in Class 1990 were missing.

The range of marks in the reduced combined student sample of 236 ranged from 2 to 9 with a mean of 5.8 points and standard deviation of 1.38. In Class 1988, the range was 6 to 6 with a mean of 8.1 and standard deviation of 1.41. For Class 1989, the range was 2 to 9 with a mean of 5.5 and standard deviation of 1.29. In this class, there were three failures on the final examination: one student withdrew from the program, one was later re-admitted and repeated the course, and the third passed the supplemental.

Educational Psychology 271/Psychology 260. The former course dealt with maturation and learning and emphasized cognitive and social development. Classes 1988 and 1989 took this course. Psychology 260 was taken by Class 1990 and focused on the study of human behaviour. University of Alberta faculty also taught these courses.

For the combined student sample, the range of marks was 3 to 9 with a mean of 6.0 points and standard deviation of 1.36. The range and mean for Class 1988 were identical to the combined sample, but the standard deviation was 1.48. One student who failed the final examination was later re-admitted to the program and repeated the course. In Class 1989, the range was 4 to 9 with a mean of 6.1 and standard deviation of 1.32. The range for Class 1990 was 3 to 9 with a mean of 5.8 and standard deviation of 1.28. There were two final examination failures in this class and both students successfully repeated the course over the summer at another institution.

Microbiology. This course provided students with an introduction to the structure and function of micro-organisms. This knowledge was then applied to infectious diseases and their management in health care. Again, information was missing for Class 1990 for the same reason as before.

In the combined student sample of Classes 1988 and 1989, the range of marks was from 4 to 9 with a mean of 7.3 points and standard deviation of 0.92. The results for Class 1988 ranged from 5 to 9 with a mean of 7.3 and standard deviation of 0.92. Class 1989 had a range of 4 to 9 with a mean of 7.2 and standard deviation of 0.93.

Of the second year variables, first semester course information was available for both Classes 1988 and 1989. For courses taken in the second semester, only information for Class 1988 was available at the time of data collection.

Nursing science 1V - semester 1. The focus of this course was the nursing process related to clients with complex adaptation problems. It emphasized establishing priorities in each step of the nursing process and nursing interventions to promote client adaptation. Although designated as one course, students were examined at the end of each semester and both marks were available.

In the first semester, there was data for 198 students in the combined student sample. The range of marks for this part of the course was 5 to 8 with a mean of 6.2 points and standard deviation of 0.72. For Class 1988, the range was 5 to 7 with a mean of 6.2 and standard deviation of 0.65. The range for Class 1989 was greater, 5 to 8, but the mean was the same and the standard deviation was 0.79.

Nursing science VI - semester 2. In the second semester, only data for Class 1988 (comprised at this point of 97 students) was available. Students' marks ranged from 5 to 7, the mean was 6.3 points and the standard deviation was 0.65.

Pharmacology 11. The therapeutic effect, adverse effects and nursing implications of certain drug groups were covered in this course. Again, only information for Class 1988 was available. For 99 students' data, the marks ranged from 5 to 7 with a mean of 6.3 points and standard deviation of 1.06.

Medical science 11. The emphasis of this course was common health problems and associated medical interventions. For the same reason as before, only data for Class 1988 (99 students) was available. Their marks ranged from 4 to 8 with a mean of 6.5 points and standard deviation of 1.06.

Professional nursing 11. Trends and issues effecting individuals and society and having implications for nursing practice were examined. Students were also introduced to basic leadership concepts. Again, this course was completed in the second semester of year two, so information was only available for 97 students in Class 1988. Their marks ranged from 6 to 9 with a mean of 8.2 points and standard deviation of 0.69.

At the time of this study, second year students in this program also took two courses taught by University of Alberta faculty on site at the school of nursing. Occupational Therapy/Nursing 319 was taken in semester 1 and Family Studies 350 in semester 2.

Occupational therapy/Nursing 319. Although the name of this course was changed in 1987, the content remained the same. It covered human development from conception to maturity, the changing periods of adulthood, the aging process and the physical and psychological factors of growth and development related to nursing.

Information about student achievement in this course was available for both Classes 1988 and 1989. In the combined student sample of 198 students, marks ranged from 2 to 8 with a mean of 5.8 points and standard deviation of 1.08. The range for Class 1988 was 4 to 8 with a mean of 6.1 and standard deviation of 0.96. For Class 1989, the range of marks was 2 to 8 with a mean of 5.6 and standard deviation of 1.15. One student failed this course. As data was collected just after it was completed, information was unavailable as to whether the student subsequently wrote and passed a supplemental examination.

Family studies 350. This course was an historical and cross-cultural introduction to the family. It emphasized the structure and function of the family in contemporary society. As this was a second semester course, only information for Class 1988 was available. The range of marks for the 96 students who took the course was 4 to 9 with a mean of 6.3 points and standard deviation of 1.00. This completes the description of second year courses.

For the two variables included for students in the last four months of the 24-month program, information was only available for Class 1988. These variables were students' marks in Professional Nursing 111 and on the comprehensive examination.

Professional nursing 111. In this course, students were prepared for their transition into a graduate nurse role. Leadership and management concepts related to team leading and the roles and functions of professional nursing organizations were included as were current trends in nursing practice and education. The range of marks achieved by the 96 students in Class 1988 was 6 to 9 with a mean of 8.1 points and standard deviation of 0.68.

Comprehensive examination. Students usually wrote this examination soon after beginning their last four months in the program. Many admitted not studying for it, choosing instead to use it as a kind of pre-test to guide their preparation for the CNATS examination written about four months later. The range of scores on this examination for 96 students in Class 1988 was 2 to 7 with a mean of 5.44 and standard deviation of 0.97.

Summary. Regarding program courses, the typical student in this study achieved the following marks in first semester courses: 6 in Biological Science, 8 in Communication, 7 in Nutrition, 7 in Nursing Science 1, 8 in Professional Nursing 1 and 6 in Educational Psychology 271/Psychology 260. In second semester courses, this student achieved 7 in both Nursing Science 11 and 111, 7 in Pharmacology 1, 6 in Medical Science 1, 6 in Educational Psychology 263/Psychology 261 and 7 in Microbiology. In the third semester, the student achieved 6 in both Nursing 1V - semester 1 and in Occupational Therapy/Nursing 319. In fourth semester, the typical student achieved 6 in Nursing Science 1V -semester 2, 7 in Pharmacology 11, 7 in Medical Science 11, 8 in Professional Nursing 11 and 6 in Family Studies 350. Finally, in the fifth semester of the program, the typical student achieved 8 in Professional Nursing 111 and 5 on the comprehensive examination.

## Predictive Analysis

There were 27 pre-admission predictor variables used in the multiple regression analysis to predict students' success in the six semester 1 courses. These six criterion variables were then added to the previous pre-admission predictor variables and used to predict students' success in semester 2 and so on. In other words, the variables of program courses that were initially criterion variables later became predictors for subsequent courses in the program. To predict students' semester 5 average, 46 predictor variables were included in the regression analysis. Of these, the number of variables that appeared in one or more of the multiple regression equations produced by the analysis was 37 when the interview rating was not included as a predictor variable (which allowed for a larger sample size) and 27 when it was. Some of these variables appeared in numerous equations and others appeared only once. Table 6 provides a list of all the variables used at some point in the analysis as predictors.

Table 6

Variables

| Name | Data for Class | Sample (N) |
|---|---|---|
| Pre-admission variables | | |
| 1. Gender | 1988, 1989, 1990 | 338 |
| 2. Expectations | 1988, 1989, 1990 | 338 |
| 3. Marital 1 | 1988, 1989, 1990 | 338 |
| 4. Marital 2 | 1988, 1989, 1990 | 338 |
| 5. Domicile | 1988, 1989, 1990 | 338 |
| 6. No. of Children | 1988, 1989, 1990 | 338 |
| 7. Singlex (Sing. Parent) | 1988, 1989, 1990 | 351 |
| 8. Age | 1988, 1989, 1990 | 340 |
| 9. Maturity | 1988, 1989, 1990 | 340 |
| 10. English 30 | 1988, 1989, 1990 | 339 |
| 11. Biology 30 | 1988, 1989, 1990 | 338 |
| 12. Recency | 1988, 1989, 1990 | 340 |
| 13. High School Average | 1988, 1989, 1990 | 339 |
| 14. Upgraded | 1988, 1989, 1990 | 340 |
| 15. Post-sec. 1 | 1988, 1989, 1990 | 340 |
| 16. Post-sec. 2 | 1988, 1989, 1990 | 340 |
| Assessment test variables | | |
| 17. C.A.T. Reading | 1988, 1989, 1990 | 340 |
| 18. C.A.T. Comprehension | 1988, 1989, 1990 | 340 |
| 19. Total Reading | 1988, 1989, 1990 | 340 |
| 20. Reference Skills | 1988, 1989, 1990 | 340 |
| 21. C.S.I. | 1988, 1989, 1990 | 340 |
| 22. T.C.S. Sequences | 1988, 1989, 1990 | 340 |
| 23. T.C.S. Analogies | 1988, 1989, 1990 | 340 |
| 24. T.C.S. Memory | 1988, 1989, 1990 | 340 |
| 25. T.C.S. Verbal Reas. | 1988, 1989, 1990 | 340 |
| 26. Total T.C.S. | 1988, 1989, 1990 | 340 |
| 27. Interview | 1988, 1989, 1990 | 234 |
| Semester 1 variables | | |
| 28. Biological Science | 1988, 1989, 1990 | 331 |
| 29. Communication | 1988, 1989, 1990 | 338 |
| 30. Nursing Science 1 | 1988, 1989, 1990 | 335 |
| 31. Prof. Nursing 1 | 1988, 1989, 1990 | 326 |
| 32. Ed.Psy. 217/Psy. 260 | 1988, 1989, 1990 | 330 |
| 33. Nutrition | 1988, 1989 | 240 |

(continued)

| Name | Data for Class | Sample (N) |
|---|---|---|
| Semester 2 variables | | |
| 34. Nursing Science 11 | 1988, 1989 | 220 |
| 35. Nursing Science 111 | 1988, 1989 | 206 |
| 36. Pharmacology 1 | 1988, 1989 | 208 |
| 37. Medical Science 1 | 1988, 1989 | 208 |
| 38. Ed. Psy. 263/Psy.261 | 1988, 1989 | 236 |
| 39. Microbiology | 1988, 1989 | 208 |
| Semester 3 variables | | |
| 40. Nsg. Sci. 1V - Sem. 1 | 1988, 1989 | 198 |
| 41. Occup. Th./Nsg. 319 | 1988, 1989 | 198 |
| Semester 4 variables | | |
| 42. Nsg. Sci. 1V - Sem. 2 | 1988 | 97 |
| 43. Pharmacology 11 | 1988 | 99 |
| 44. Medical Science 11 | 1988 | 99 |
| 45. Prof. Nursing 11 | 1988 | 97 |
| 46. Family Studies 350 | 1988 | 96 |
| Semester 5 variables | | |
| 47. Prof. Nursing 111 | 1988 | 92 |
| 48. Comprehensive Exam. | 1988 | 92 |

A total of 48 multiple regression equations were produced for all the criterion variables during the analysis of the study's data. When the interview rating was not included as a predictor variable, there were 27 equations. By not using it, because most of its data for Class 1988 was missing, the greatest amount of data across variables was utilized. Including the interview variable (for criterion variables up to the end of semester 3, after which it would have eliminated most of the sample as there was so much missing data for the interview) produced another 18 equations. In spite of the missing data, the relationship between the interview and other variables was of particular interest to the selection committee. Chemistry 30 was not included as a predictor variable in any of the equations as so much of its data were also missing. Selected for discussion were the regression equations that predicted students' success in each of the six courses in semester 1 and semester 2, 3, 4 and 5 averages.

### Semester 1 Courses

The multiple regression equations for each of these criterion variables are presented and discussed. The set of predictor variables from which those that entered the equations were selected included variables #1 to 26, when the interview was not included, and #1 to 27 when it was (see Table 6).

Biological science. Seven predictor variables entered the regression equation when this course was the criterion variable regardless of whether the interview variable was included. The variables entering at steps 1 to 5 were the same. Those entering at steps 6 and 7 were different, however, depending on whether or not the interview was included in the set of variables (see Table 7).

Table 7

Equation 1- Biological Science

| Step | # - Pred. Var. | | B | Beta |
|---|---|---|---|---|
| *1 | 13 | High Sch. Av. | 0.0575 | 0.2761 |
| 2 | 12 | Recency | 0.4132 | 0.2451 |
| 3 | 24 | Memory | 0.0030 | 0.2878 |
| 4 | 11 | Biology 30 | 0.0348 | 0.2481 |
| 5 | 15 | Post-sec. 1 | - 0.4112 | -0.1641 |
| 6 | 5 | Domicile | 0.3983 | 0.1330 |
| 7 | 1 | Gender | 0.5318 | 0.1165 |
| (Constant) | | | -4.1062 | 0.0 |
| * with interview (N=219) | | | r=.61 | $p \leq .05$ |
| **1 | 13 | High Sch. Av. | 0.0730 | 0.3558 |
| 2 | 12 | Recency | 0.3084 | 0.2011 |
| 3 | 24 | Memory | 0.0022 | 0.2094 |
| 4 | 11 | Biology 30 | 0.0236 | 0.1701 |
| 5 | 15 | Post-sec. 1 | -0.2765 | -0.1107 |
| 6 | 20 | Ref. Skills | 0.0019 | 0.1107 |
| 7 | 10 | English 30 | -0.0214 | -0.1308 |
| (Constant) | | | -2.3346 | 0.0 |
| ** without interview (N=318) | | | r=.56 | $p \leq .05$ |

Since the variable "interview" did not enter the equation, the difference in the predictors that did may be due to sample size. The five best predictors of students being successful in this course were, however, the same. They included students' high school average, less recent completion of high school, their score on the memory section of the T.C.S., their biology 30 mark and some previous post-secondary education. Other predictors when the interview was included were students not living with children (i.e., had none or lived with them only on week-ends) and being male. When it was not included, students' score on the reference skills section of the C.A.T. and their English 30 mark were predictors.

_Communication_. Again, there were similarities and differences among predictor variables depending on whether the interview variable was included. However, six predictor variables entered the equation in each case (see Table 8).

Table 8

_Equation 2 - Communication_

| Step | # - Pred. Var. | | B | Beta |
|---|---|---|---|---|
| *1 | 19 | Tot. Reading | 0.0021 | 0.1391 |
| 2 | 25 | Verb. Reas. | 0.0025 | 0.2036 |
| 3 | 27 | Interview | 0.0436 | 0.1825 |
| 4 | 14 | Upgraded | 0.3186 | 0.1573 |
| 5 | 24 | Memory | 0.0015 | 0.1762 |
| 6 | 12 | Recency | 0.1843 | 0.1397 |
| (Constant) | | | -0.6957 | 0.0 |

* with interview (N=219) r=.51 $p \leq .05$

(continued)

| Step | # - Pred. Var. | | B | Beta |
|---|---|---|---|---|
| **1 | 19 | Tot. Reading | 0.0020 | 0.1402 |
| 2 | 25 | Verb. Reas. | 0.0022 | 0.1835 |
| 3 | 14 | Upgraded | 0.3045 | 0.1593 |
| 4 | 24 | Memory | 0.0013 | 0.1755 |
| 5 | 9 | Maturity | -0.3602 | -0.1927 |
| 6 | 2 | Expectations | 0.4257 | 0.1569 |
| (Constant) | | | 2.608 | 0.0 |

** without interview (N=318) r=.47 $p \leq .05$

In both equations, four of the six variables for predicting success in this course were the same although some of them entered at different steps. The predictors included students' C.A.T. total reading score, their score on the T.C.S. verbal reasoning section, not upgrading high school marks and their score on the memory section of the T.C.S. When the interview variable was included, it entered at step 3 and less recent completion of high school entered at step 6. Without including the interview, mature student status and not having realistic expectations entered the equation.

Nutrition. For this criterion variable, including the interview resulted in the selection of three significant predictors, and not including it in the selection of a single predictor (see Table 9). As noted earlier, the sample size was reduced for this variable as the course was discontinued in 1987, eliminating Class 1990's data.

Table 9

Equation 3 - Nutrition

| Step | # | - Pred. Var. | B | Beta |
|---|---|---|---|---|
| *1 | 24 | Memory | 0.0020 | 0.2353 |
| 2 | 9 | Maturity | -0.5799 | -0.2782 |
| 3 | 2 | Expectations | 0.6243 | 0.2161 |
| (Constant) | | | 4.664 | 0.0 |
| * with interview (N=107) | | | r=.40 | $p \leq .05$ |
| **1 | 13 | High Sch. Av. | 0.321 | 0.1693 |
| (Constant) | | | 5.038 | 0.0 |
| ** without interview (N=204) | | | r=.17 | $p \leq .05$ |

Again, including the interview variable may have only caused the sample size to be reduced rather than changing the nature of the predictors because it was included. In any case, the predictions for these equations were quite different. Including the interview variable resulted in students' score on the T.C.S. section of memory, their mature student status and not having realistic expectations entering the equation. By not including the interview, only students' high school average was a predictor of their success in this course.

Nursing science 1. Using this course as the criterion variable, six predictor variables entered the equation when the interview was included and seven when it was not. As with other courses, of the predictor variables that entered each equation, some were different and some were the same, but these entered the equation at different steps. Data about this course are provided in Table 10.

Table 10

Equation 4 - Nursing Science 1

| Step | # | - Pred. Var. | B | Beta |
|---|---|---|---|---|
| *1 | 20 | Ref. Skills | 0.0024 | 0.2088 |
| 2 | 9 | Maturity | -0.4169 | -0.2374 |
| 3 | 24 | Memory | 0.0014 | 0.1961 |
| 4 | 13 | High Sch. Av. | 0.0309 | 0.2148 |
| 5 | 15 | Post-sec. 1 | -0.2731 | -0.1573 |
| 6 | 27 | Interview | 0.0276 | 0.1428 |
| (Constant) | | | 0.9618 | 0.0 |

* with interview (N=219) r=.53 $p \leq .05$

(continued)

| Step | # - | Pred. Var. | B | Beta |
|---|---|---|---|---|
| **1 | 13 | High Sch. Av. | 0.0334 | 0.2255 |
| 2 | 20 | Ref. Skills | 0.0024 | 0.1957 |
| 3 | 24 | Memory | 0.0013 | 0.1760 |
| 4 | 9 | Maturity | -0.3628 | -0.1972 |
| 5 | 6 | No. Children | -0.1776 | -0.1956 |
| 6 | 23 | Analogies | -0.0014 | -0.1362 |
| 7 | 19 | Tot. Reading | 0.0019 | 0.1355 |
| (Constant) | | | 2.6565 | 0.0 |

** without interview (N=319) $r=.49$ $p\leq.05$

These equations had the four best predictors of students' success in common, although the variables entered the equations at different steps: students' score on the reference skills section of the C.A.T., their high school average, their score on the memory section of the T.C.S. and mature student status. Including the interview variable resulted in some post-secondary education and the interview rating entering the equation. Without the interview, the fewer number of children that students had, their score on the analogies section of the T.C.S. and their total reading score entered the equation.

Professional Nursing 1. Three predictor variables entered the regression equation for this criterion variable when the interview was included and four when it was not (see Table 11).

Table 11

Equation 5 - Professional Nursing 1

| Step | # - Pred. Var. | B | Beta |
|---|---|---|---|
| *1 | 27 Interview | 0.0386 | 0.2518 |
| 2 | 20 Ref. Skills | 0.0019 | 0.2080 |
| 3 | 14 Upgraded | 0.1870 | 0.1314 |
| (Constant) | | 3.175 | 0.0 |
| * with interview (N=219) | | r=.35 | $p \leq .05$ |
| **1 | 20 Ref. Skills | 0.0016 | 0.17767 |
| 2 | 12 Recency | 0.0924 | 0.1114 |
| 3 | 14 Upgraded | 0.1593 | 0.1206 |
| 4 | 16 Post-sec. 2 | -0.1748 | -0.1120 |
| (Constant) | | 6.5104 | 0.0 |
| ** without interview (N=318) | | r=.28 | $p \leq .05$ |

In this result, the interview had an effect in two ways: it was correlated with the criterion variable more highly than other predictors when it was included in the set, and it also reduced the sample size. These equations had two out of three and four predictor variables in common, although they entered the equations at different steps: students' score on the reference skills section of the C.A.T. and not upgrading high school marks. In addition, less recent completion of high school and completion of a post-secondary diploma or degree were predictors when the interview was not included.

Educational Psychology 271/Psychology 260. When this course was a criterion variable, six predictor variables entered the regression equation if the interview was included and seven if it was not. Data for this course are presented in Table 12.

Table 12

Equation 6 - Educ. Psy. 271/Psy. 260

| Step | # - Pred. Var. | | B | Beta |
|---|---|---|---|---|
| *1 | 19 | Tot. Reading | 0.0025 | 0.1282 |
| 2 | 4 | Marital 2 | 0.2995 | 0.1849 |
| 3 | 24 | Memory | 0.0020 | 0.1844 |
| 4 | 11 | Biology 30 | 0.0247 | 0.1689 |
| 5 | 15 | Post-sec. 1 | -0.4208 | -0.1607 |
| 6 | 25 | Verb. Reas. | 0.0022 | 0.1345 |
| (Constant) | | | -0.1547 | 0.0 |
| * with interview (N=219) | | | $r=.49$ | $p \leq .05$ |
| **1 | 13 | High Sch. Av. | 0.0756 | 0.3387 |
| 2 | 19 | Tot. Reading | 0.0043 | 0.2069 |
| 3 | 4 | Marital 2 | 0.3267 | 0.1954 |
| 4 | 10 | English 30 | -0.0346 | -0.1939 |
| 5 | 24 | Memory | 0.0019 | 0.1684 |
| 6 | 12 | Recency | 0.2087 | 0.1251 |
| 7 | 5 | Domicile | 0.4240 | 0.1309 |
| (Constant) | | | -2.4162 | 0.0 |
| ** without interview (N=318) | | | $r=.48$ | $p \leq .05$ |

Again, there were similarities and differences among the predictor variables and when they entered these equations, with three in common: students who were married and the scores students achieved on the total reading section of the C.A.T. and the memory section of the T.C.S. When the interview was included in the predictor variables, three other predictors entered the regression equation for this course: students' Biology 30 mark, some post-secondary education and their score on the verbal reasoning section of the T.C.S. Not including the interview variable allowed students' high school average, their English 30 mark, less recent completion of high school and not living with children to enter the regression equation. Again, these results may be due to the sample size being reduced by the interview variable.

Summary. In defining success for students in the six semester 1 courses, a variety of pre-admission and assessment test variables were predictors. Given the results of this study, the selection committee should pay particular attention to the following pre-admission variables when accepting applicants into the school of nursing: high school averages, less recent completion of high school, no upgrading done or being done of marks previously achieved in high school courses prior to admission, mature student status (i.e., those students 21 years of age or older by registration day) and grade achieved in Biology 30.

It is commonly accepted that previous academic achievement has some relationship to future academic achievement which explains the significance of students' high school averages. Students who did not upgrade their high school marks apparently achieved adequate ones initially. Mature students may be more goal-directed than younger students and may be making significant sacrifices to attend the post-secondary program of their choice. The result of Biology 30 being a strong predictor is also not surprising, as it helps prepare students for Biological Science.

Of the assessment test variables, the selection committee should pay particular attention to applicants' scores on the memory and verbal reasoning sections of the T.C.S. and their scores on the total reading and reference skills sections of the C.A.T. Given that memory measured a students' ability to learn new information and recall it later, it is not surprising that this variable was a significant predictor. After all, for most students, most of what they learned in semester 1 of the program was new information and they were expected not just to recall it later, but also to apply it. Similarly, verbal reasoning measured a students' ability to discern relationships and reason logically, so this finding is also not surprising. The program's curriculum was designed to enable students to apply learning from one course to another starting from simple concepts and moving to complex ones. Being able to reason logically is fundamental to problem-solving and critical thinking, characteristics that the faculty attempts to develop and foster in students.

The entire C.A.T. (i.e., total reading, a combined score of how students did on both the reading vocabulary and reading comprehension sections, and reference skills) was a significant predictor of success in semester 1. In the program, students are expected to understand the vocabulary in their texts, to comprehend what they read, to cope with a large volume of reading on a regular basis and to utilize available learning resources and reference material.

### Semester 2 Average

This criterion variable was composed of the average of variables #34 - 39 (see Table 6). Data for these variables were available for Classes 1988 and 1989. The set of predictor variables from which those that entered the regression equation for this criterion variable were selected included #1 to 33 when the interview was included and #1 to 26 and #28 to 33 (see Table 6) when it was not. The resulting equations had four and five steps respectively (see Table 13).

Table 13

Equation 7 - Semester 2 Average

| Step | # - Pred. Var. | B | Beta |
|---|---|---|---|
| *1 | 28 Bio. Sci. | 0.4592 | 0.6412 |
| 2 | 4 Marital 2 | 0.1691 | 0.1808 |
| 3 | 33 Nutrition | 0.1497 | 0.1881 |
| 4 | 19 Tot. Reading | 0.0020 | 0.1616 |
| (Constant) | | 1.5503 | 0.0 |
| * with interview (N=106) | | r=.85 | $p \leq .05$ |
| **1 | 28 Bio. Sci. | 0.4320 | 0.6127 |
| 2 | 33 Nutrition | 0.1674 | 0.2361 |
| 3 | 8 Age | 0.0218 | 0.1654 |
| 4 | 31 Prof. Nsg. 1 | 0.1475 | 0.1305 |
| 5 | 19 Tot. Reading | 0.0012 | 0.0931 |
| (Constant) | | 0.4436 | 0.0 |
| ** without interview (N=203) | | r=.85 | $p \leq .05$ |

Biological Science was clearly the best predictor in this equation. In predicting students' semester 2 average, the regression equations with and without the interview variable shared two other predictor variables. These were students' grades in Nutrition as well as their C.A.T. total reading score. In addition, when the interview was a variable, married students were more likely to succeed than non-married ones. When the interview variable was not included, the older students were and their Professional Nursing 1 mark were predictors of success. The multiple correlations of r = .85 for these equations were much higher than in any of the correlations for individual semester 1 courses, indicating a significant relationship between how students did academically in the first semester of the program and how they did in the second.

### Semester 3 Average

This criterion variable was composed of the average of variables #40 and 41 (see Table 6). The set of predictor variables used to predict students' semester 3 average included #1 to 39 when the interview was included and #1 to 26 and #28 to 39 (see Table 6) when it was not, creating the multiple regression equation in Table 14.

Table 14

Equation 8 - Semester 3 Average

| Step | # - Pred. Var. | B | Beta |
|---|---|---|---|
| *1 | 36 Pharmacology 1 | 0.3493 | 0.4817 |
| 2 | 34 Nsg. Sci. 11 | 0.2438 | 0.2538 |
| 3 | 17 C.A.T. Reading | 0.0020 | 0.1593 |
| 4 | 15 Post-sec. 1 | -0.2184 | -0.1371 |
| (Constant) | | 0.5465 | 0.0 |
| * with interview (N=97) | | $r=.77$ | $p \leq .05$ |
| **1 | 36 Pharmacology 1 | 0.2088 | 0.2704 |
| 2 | 34 Nsg. Sci. 11 | 0.2052 | 0.2126 |
| 3 | 30 Nsg. Sci. 1 | 0.1213 | 0.1472 |
| 4 | 32 Ed. Psy. 271 | 0.0650 | 0.1167 |
| 5 | 14 Upgraded | 0.2362 | 0.1440 |
| 6 | 37 Med. Sci. 1 | 0.1233 | 0.1840 |
| (Constant) | | 0.4933 | 0.0 |
| ** without interview (N=196) | | $r=.76$ | $p \leq .05$ |

Again, the interview variable appears to have reduced the sample size without making any contribution to the prediction of the semester 3 average. Regardless of whether it was included in the set of variables to predict students' success at the end of semester 3, marks in both Pharmacology 1 and Nursing Science 11 were significant predictors. When the interview was included, the score on the reading section of the C.A.T. and having some previous post-secondary education were also predictors. Not including the interview allowed marks in Nursing Science 1, Educational Psychology 217/Psychology 260 and Medical Science 1 and not having done high school upgrading to enter the regression equation. Similar to the prediction for semester 2 average, the multiple correlations for these equations were also significant. This indicates there is a strong relationship between how students did academically in the second semester and how they did in the third one.

### Semester 4 Average

Similarly, this criterion variable was composed of the average of variables #42 - 46 (see Table 6). The set of predictor variables from which those that entered the equation were selected included variables #1 to 26 and #28 to 41 (see Table 6) without the interview variable. At this point, the sample consisted only of students in Class 1988 and very little interview data were available for them. The resulting equation had seven steps and is shown in Table 15.

Table 15

Equation 9 - Semester 4 Average

| Step | # | - Pred. Var. | B | Beta |
|---|---|---|---|---|
| **1 | 28 | Biological Sci. | 0.1203 | 0.2056 |
| 2 | 30 | Nsg. Sci. 1 | 0.3125 | 0.2894 |
| 3 | 36 | Pharmacology 1 | 0.1485 | 0.1847 |
| 4 | 32 | Ed. Psy. 271 | 0.0811 | 0.1559 |
| 5 | 1 | Gender | -0.3885 | -0.1362 |
| 6 | 37 | Med. Sci. 1 | 0.1481 | 0.2475 |
| 7 | 6 | No. Children | -0.0816 | -0.1328 |
| (Constant) | | | 2.1196 | 0.0 |

** without interview (N=93) r=.94 $p \leq .05$

This regression equation had a very high correlation and may indicate that the further along in the program students go, the stronger the relationship between the courses they have successfully completed and the next ones they will take. Five courses in year 1 of the program were five of the six best predictors of students' succeeding to the end of semester 4: Biological Science, Nursing Science 1, Pharmacology 1, Educational Psychology 271/Psychology 260 and Medical Science 1. In addition, being female and having fewer children were predictors for semester 4 average.

### Semester 5 Average

This criterion variable was composed of the average of variables #47 and 48 (see Table 6). The set of predictor variables for this equation included #1 to 26 and #28 to 46 (see Table 6). The sample for this equation also consisted of only Class 1988 and information about this variable is shown in Table 16.

Table 16

Equation 10 - Semester 5 Average

| Step | # | - Pred. Var. | B | Beta |
|---|---|---|---|---|
| **1 | 37 | Med. Sci. 1 | 0.2514 | 0.4751 |
| 2 | 45 | Prof. Nsg.11 | 0.1771 | 0.1917 |
| 3 | 19 | Tot.Reading | 0.0026 | 0.2369 |
| 4 | 2 | Expectations | 0.5593 | 0.3127 |
| 5 | 1 | Sex | -0.6156 | -0.2440 |
| 6 | 15 | Post-sec. 1 | -0.3045 | -0.2416 |
| 7 | 41 | Nsg. 319 | -0.1255 | -0.1935 |
| 8 | 11 | Biology 30 | 0.0108 | 0.1582 |
| (constant) | | | 1.8646 | 0.0 |

** without interview (N=92) r=.77 $p \leq .05$

Like the multiple correlations for the other regression equations predicting semester averages in the program, the one for this equation is also significant. The strongest predictor for this criterion variable was Medical Science 1, pathophysiology, knowledge of which students would need to utilize and continue to increase throughout the program. Professional Nursing 11, total reading score, not having realistic expectations, being female, having some post-secondary education, doing less well in Nursing 319 and Biology 30 mark were also defined as predictors for the semester 5 average.

Summary. Predictors semester 2, 3, 4 and 5 averages were primarily previous program courses, as well as a few pre-admission criteria and parts of the C.A.T. Biological Science and Pharmacology 1 were the strongest overall semester average predictors followed by Nursing Science 11, Nutrition, Educational Psychology 271/Psychology 260 and Medical Science 1. C.A.T. reading and total reading entered three equations as predictors. Two variables entered the semester average equations twice: having some post-secondary education and being female. Other demographic and academically related variables entered these equations once: being married, being an older student, not having upgraded, not having realistic expectations and, if a parent, having fewer children. Obviously, students must successfully complete semester 1 before the predictors for subsequent semesters become relevant. Therefore, the selection committee needs to pay the most attention to the predictors of success for the six courses in semester 1 of the program.

## Summary

The multiple regression analysis in this study defined predictors of success for students in this nursing diploma program. In defining success in the six semester 1 courses, a variety of pre-admission and assessment test variables were predictors. Predictors for semester 2, 3, 4 and 5 averages were primarily previous program courses as well as a few pre-admission criteria and parts of the C.A.T.

It should be noted that the unequal sample sizes as a result of missing data may have influenced the predictor variables selected in various regression equations. Also, an important variable, Nursing Practice, was omitted from the analysis in this study. Had it been graded in some way other than satisfactory/unsatisfactory making it easier to included in the analysis, useful and interesting information might have resulted. One can only speculate on the ability of the interview rating given students to predict their success in the clinical areas. As the interview assesses applicants' interpersonal skills and motivation for choosing nursing, this seems plausible.

# CHAPTER V

## Conclusions and Recommendations

The challenge of selecting those students most likely to succeed in post-secondary educational programs persists, in particular, in nursing with its limited placements and clinical components. The literature has identified various demographic, academic and assessment test predictors of student success in various nursing programs. It has also identified other screening tools such as references, autobiographical letters/essays and interviews as means to this end. However, no magical recipe was found. Because nursing programs have different admission/selection criteria, curricula and duration, perhaps success predictors for students can best be determined for individual programs. Even then, "cross validation of prediction studies" and "the need for periodic sampling of previously validated prediction batteries due to changing elements in selection programs" (Wold & Worth, 1990, p. 84) are important. This study identified those for students in a 24 month hospital-based nursing diploma program.

## Summary and Findings

Descriptive, correlational research methods were used in this study to provide information about the sample and to determine the relationship between students' demographic information, pre-admission academic criteria and related variables, assessment test results and selection interview rating, and their success in the program. Data were recorded retrospectively for 351 students, admitted in 1985, 1986 and 1987 and graduated in 1988, 1989 and 1990, that provided the following results when analyzed.

### Descriptive Analyses

Descriptive statistics were used to analyze the 48 variables included in the study. Not surprisingly, students in the sample were predominantly female. Approximately one-third of the students were under 21 years of age, another third between 21 and 25 years and the rest ranged from 26 to 47 years. About two-thirds of the sample were single; the rest were married, separated, divorced, widowed or living common-law. Although the majority of students were not parents, nearly a quarter of those in the sample had one to five children with whom they lived. When they entered the program, less than 15% of students had realistic expectations of what their future career entailed, based on health care work experience.

Most students in the sample had completed English 30 and Biology 30 as required for admission and their average marks in these courses were 69% and 73% respectively. Just over 20% of the sample lacked Chemistry 30 prior to it being required. The mean high school average was 71%. Approximately two-thirds of the students in the study had completed high school recently, with the rest completing it between four and more than 10 years earlier. Almost half the sample had taken some post-secondary education previously; of those, about one-quarter had completed a diploma or degree prior to admission to the program.

The means on the C.A.T. subsections and total reading were approximately 700, between 718 and 775 on the T.C.S. subsections and total T.C.S. and the average C.S.I. was 104. Selection interview rating information was available for two-thirds of the sample and the average rating for this group was 73 out of a possible 85.

Students were generally successful (defined by this study as passing their academic courses), although some left the program at different points for a variety of reasons. Most course failures occurred in Biological Science and other semester 1 courses. These failures represent a much smaller attrition rate than is generally acknowledged in the literature for nursing and similar programs. It was unusual for a student in this study to fail academically in semesters 2 to 5.

### Predictive Analyses

Step-wise multiple regression analysis defined predictors of success for students in this program for six semester 1 courses and semester 2, 3, 4 and 5 averages. The best predictors for semester 1 success were high school average, less recent completion of high school, not upgrading high school courses prior to admission, mature student status and grade achieved in Biology 30.

It was surprising that having realistic expectations was not a predictor and that previous post-secondary experience was not a stronger predictor. Perhaps there might have been a correlation between these variables and clinical practice had it been included in the study. Recency (i.e., less recent completion of high school) and maturity, both significant predictors, complement one another. Given that about two-thirds of the students in the sample were over 21, many of them had probably completed the high school requirements for admission more than three years earlier.

For completion of subsequent semesters, the best predictors were primarily courses previously taken in the program, in particular, Biological Science and Pharmacology 1. Therefore, it would seem that students who were academically successful in semester 1 were more likely to continue being academically successful in the rest of the program.

## Limitations of the Study

There were several problematic areas in this study. The difficulty of including the variable of students' clinical experience has been mentioned. It was unfortunate this could not be included in the analysis, as valuable information might have been discovered. Also, as so much data were missing for the Chemistry 30 variable, it too was not included in the regression analysis. Had it been, it might have entered one or more equations as Biology 30 did. Further, including the interview variable in the analysis may have confounded the results. Rather than changing the nature of the predictors in a regression equation, in fact, it may have had little effect except to reduce the sample size. Listwise deletion of data also effectively reduced the sample size of variables and may have effected the outcomes of the study. The changed curriculum in the nursing program where the study took place may limit the generalizability of the results. Finally, better predictions would have occurred if all of the applicants, not just those who were accepted into the program, had been included in the study.

## Implications for Nursing Education

This study presented results about predictors of success for the purpose of screening and selecting applicants most likely to complete a 24 month hospital-based nursing diploma program. These results support continued careful evaluation of applicants' demographic information and academic history as well as the usefulness of their C.A.T. and T.C.S. results. The study has, however, focused primarily on students' academic performance, which, in a program that has a major clinical component, is only part of what determines their eventual success. Their clinical practice is the real test of their success as students and also as professional nurses. Students' ability to apply what they learn academically; their interpersonal effectiveness, organizational skills and leadership abilities; and their on-going professional development may contribute to their becoming excellent nurses, capable of providing superior health care. The challenge remains for those involved in selecting students for nursing programs of how to effectively assess these qualities at the application stage. This challenge and the need to identify predictors of success for students in the collaborative nursing program recently implemented in Edmonton and Red Deer invites further investigation.

Another issue also deserves attention. Underlying the awesome task of selecting approximately 120 applicants annually out of the several hundred who apply to this program is the multiple application issue. Over the years, programs have encouraged applicants to apply to more than one program as a way to enhance their chances of being accepted. The result has become nearly unmanageable for some programs. It is also expensive for applicants, who pay an application fee to each institution to whom they apply. The cooperation among nursing programs that has been evident in the development and implementation phases of the collaborative nursing program has laid the ground work for a central application process.

This process would enable an applicant to prioritize the programs of their choice, be considered by their first (second or third) choice and spend less money on application fees. For the institutions involved, those individuals who process applications would be less inundated with paper and thus have more time to carefully review applicants' files. They would also spend less time screening applications as only those from people who really want to study at their institution would be assessed. Fewer applicants on the waiting list would need to be used as there would likely be fewer pre-admission withdrawals. In addition, each institution would still be free to continue or develop whatever specific or unique screening process they chose. A model exists in the Ontario post-secondary education system; perhaps the time has come to implement something similar among the institutions involved in the collaborative nursing program.

## Recommendations for Further Study

In 1991, the collaborative nursing program was implemented at four nursing education sites in Edmonton and a year earlier at Red Deer College. This venture invites joint research in any number of areas, due to the relatively minor curricular differences that now exist between the institutions involved in the program. The solution may have thus been found, on a small scale, to one of the difficulties identified in the literature of differences between programs limiting the generalizability of research findings. The common elements in these programs may also reduce the conflicting results of the resulting research due to less diversity among the programs.

Following more students through to the completion of their programs might also allow more generalizability of the results. Including the variable of CNATS examination results in the analysis would complete the students' nursing education journey as they must pass it before being allowed to practice as a registered nurse. Finding a way to determine predictors of success for students in their clinical practice seems particularly important. Some discussion has taken place at the program in this study regarding the feasibility of assigning a grade to students' clinical practice. If this change is implemented, research into this area of concern may be possible.

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# Appendix A

## INTERVIEW EVALUATION

NAME: ______________________________

| | CRITERIA | Excellent | | Average | | Poor |
|---|---|---|---|---|---|---|
| 1 | PHYSICAL APPEARANCE: | 5 | 4 | 3 | 2 | 1 |
| | DRESS AND GROOMING: | 5 | 4 | 3 | 2 | 1 |
| 2 | NON-VERBAL COMMUNICATION: | 5 | 4 | 3 | 2 | 1 |
| | EYE CONTACT: | 5 | 4 | 3 | 2 | 1 |
| | GRAMMER & VOCABULARY: | 5 | 4 | 3 | 2 | 1 |
| | SELF-EXPRESSION: | 5 | 4 | 3 | 2 | 1 |
| | PARTICIPATION: | 5 | 4 | 3 | 2 | 1 |
| 3 | INSIGHT INTO STRENGTHS and WEAKNESSES: | 5 | 4 | 3 | 2 | 1 |
| | EMOTIONAL MATURITY: | 5 | 4 | 3 | 2 | 1 |
| | AWARE OF OWN VALUES: | 5 | 4 | 3 | 2 | 1 |
| | ACCEPTS VALUES OF OTHERS: | 5 | 4 | 3 | 2 | 1 |
| 4 | KNOWLEDGE - Nursing, Career and Program: | 5 | 4 | 3 | 2 | 1 |
| | ASKED QUESTIONS: | 5 | 4 | 3 | 2 | 1 |
| | HAS REALISTIC EXPECTATIONS OF ACADEMIC DEMANDS: | 5 | 4 | 3 | 2 | 1 |
| 5 | REFERENCES: | 5 | 4 | 3 | 2 | 1 |
| | QUESTIONNAIRE: | 5 | 4 | 3 | 2 | 1 |
| | COMPLETENESS OF FILE & FOLLOW-THRU WITH REQUESTS: | 5 | 4 | 3 | 2 | 1 |

**BROAD CATEGORIES:**

1 APPEARANCE (10) _____

2 COMMUNICATION (25) _____

3 PERSONAL CHARACTERISTICS (20) _____

4 PROGRAM (15) _____

5 FILE (15) _____

MAX. 85 TOTAL _____

BONUSES: (Specify and/or Elaborate
WORK EXPERIENCE ______________________________

HOSP/HEALTH RELATED EXPERIENCE ______________________________

POST SECONDARY EDUCATION ______________________________

C.P.R./First Aide ______________________________

PARENTHOOD ______________________________

PENALTIES: (Specify and/or Elaborate)
WITHDRAWALS FROM COURSES ______________________________

COURSES FAILURES ______________________________

COURSE REPEATS ______________________________

HEALTH CONCERNS: ______________________________

COMMENTS: ______________________________

______________________________

RECOMMENDATION:
ACCEPT:
CONDITIONAL ACCEPT:
WAIT FOR MARKS:
NOT ACCEPTABLE:

DATE: ______________________________ INTERVIEWER: ______________________________

SN #39

# Appendix B

University of Alberta
Edmonton
Canada T6G 2M7

Office of the Registrar
120 Administration Building, Telephone (403) 492-3113

# Grading System Guide

The following guide reflects the most commonly used grading systems in Canadian post-secondary institutions and is designed to assisit institutions in the comparison of the grading system used by the University of Alberta (9 point scale) to other grading systems. Please note that this is a guide only and should be used in conjunction with both the transcripts and grading descriptions found in the calendars of the institutions being compared.

| 9 point | (Percentage) (60% pass) | (Percentage) (50% pass) | Alpha | 4 point |
|---|---|---|---|---|
| | 100 | 100 | | |
| | 99 | 99 | | |
| | 98 | 98 | | |
| 9 | 97 | 97 | A+ | 4.0 |
| | 96 | 96 | | |
| | 95 | 95 | | |
| | 94 | 94 | | |
| | 93 | 93 | | |
| | 92 | 92 | | |
| | 91 | 91 | | |
| 8.7 | 90 | 90 | A | 3.9 |
| | 89 | 89 | | |
| | 88 | 88 | | |
| | 87 | 87 | | |
| | 86 | 86 | | |
| | 85 | 85 | | |
| | 84 | 84 | | |
| 8 | 83 | 83 | A- | 3.7 |
| | 82 | 82 | | |
| | 81 | 81 | | |
| | 80 | 80 | | |
| | 79 | 79-78 | | |
| 7.3 | 78 | 77 | B+ | 3.3 |
| 7 | 77 | 76-74 | | |
| | 76 | 73-71 | | |
| 6.5 | 75 | 70 | B | 3.0 |
| | 74 | 69 | | |
| | 73 | 68-67 | | |
| 6 | 72 | 66 | B- | 2.7 |
| | 71 | 65 | | |
| | 70 | 64 | | |
| | 69 | 63 | | |
| 5.5 | 68 | 62 | C+ | 2.3 |
| | 67 | 61 | | |
| | 66 | 60 | | |
| 5.1 | 65 | 59-58 | C | 2.0 |
| 5 | 64 | 57-56 | | |
| | 63 | 55 | | |
| 4.7 | 62 | 54 | C- | 1.7 |
| | 61 | 53-51 | | |
| 4 | 60 | 50 | | |
| 3.8 | 59 | | D+ | 1.3 |
| | 58 | | | |
| | 57 | | | |
| | 56 | | | |
| | 55 | | | |
| 3 | 54 | | D | 1.0 |
| | 53 | | | |
| | 52 | | | |
| | 51 | | | |
| 2 | 50 | | D- | 0.7 |

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